

## **Arlington Conservation Commission**

Date: Thursday, March 7, 2024

**Time:** 7:00 PM

Location: Conducted by Remote Participation.

Please register in advance for this meeting. Reference materials, instructions, and access information for this specific meeting will be available 48 hours prior to the meeting on the Commission's agenda and minutes page. This meeting will be conducted in a remote format consistent with Chapter 2 of the Acts of 2023, which further extends certain COVID-19 measures regarding remote participation in public meetings until March 31, 2025. Please note: Not all items listed may in fact be discussed and other items not listed may be brought up for discussion to the extent permitted by law. This agenda includes those matters which can be reasonably anticipated to be discussed at the meeting.

#### **Agenda**

- 1. Administrative
  - Meeting Minutes.
  - b. Correspondence Received.
    All correspondence is available to the public. For a full list, contact the Conservation Agent at <a href="mailto:concomm@town.arlington.ma.us">concomm@town.arlington.ma.us</a>.

#### 2. Discussion

- a. 66-66R Dudley Street Administrator Update.
- b. Water Bodies Working Group.
  - 1. Review and approval of FY25 Budget.
- c. Tree Committee Update.
- d. Artificial Turf Study Committee Update (next meeting 3/12/24).
- 3. Hearings

#### DEP #091-0359: 51 Grove Street.

DEP #091-0359: 51 Grove Street.

This public hearing will consider a Notice of Intent for additional work to rehabilitate a section of a culvert with a structural liner system at/near 51 Grove Street within Bank, Land Under Water, and Bordering Land Subject to Flooding associated with Mill Brook.

#### DEP #091-0357: Notice of Intent: 51 Burch Street (Continuation from 2/15/2024).

DEP #091-0357: Notice of Intent: 51 Burch Street (Continuation from 2/15/2024).

This public hearing will consider a Notice of Intent to demolish a single-family dwelling and construct a

two-family dwelling and associated site appurtenances at 51 Burch Street within Bordering Land Subject to Flooding.

#### DEP #091-0360: 2 Reservoir Road.

DEP #091-0360: 2 Reservoir Road.

This public hearing will consider a Notice of Intent to construct an addition off the rear of a single-family dwelling, renovate a front porch, and conduct landscaping and hardscaping activities within Riverfront Area and Bordering Land Subject to Flooding associated with Mill Brook, and within the 100-foot Buffer Zone to Bordering Vegetated Wetlands.

#### DEP #091-0356: Notice of Intent: Thorndike Place (Continuation from 2/15/2024).

DEP #091-0356: Notice of Intent: Thorndike Place (Continuation from 2/15/2024). The Conservation Commission will hold a public hearing under the Wetlands Protection Act to consider a Notice of Intent for the construction of Thorndike Place, a multifamily development on

Dorothy Road in Arlington. This hearing will be limited to discussion regarding the peer review of the restoration plan.

#### Request for Determination of Applicability: 459 Mystic Street.

Request for Determination of Applicability: 459 Mystic Street.

This public hearing will consider a Request for Determination of Applicability for the construction of an addition and deck expansion at 459 Mystic Street, within the 100-foot Buffer Zone to Bordering Vegetated Wetlands.

# <u>DEP #091-0278: Amendment to Order of Conditions: 88 Coolidge Road (Continued from 2/15/2024).</u>

DEP #091-0278: Amendment to Order of Conditions: 88 Coolidge Road (Continued from 2/15/2024). This public hearing will consider the peer review report for an amendment to an Order of Conditions for construction of a new house at 88 Coolidge Road in the Buffer Zone to a Bordering Vegetated Wetland.



## **Town of Arlington, Massachusetts**

## Correspondence Received.

**Summary:** Correspondence Received.

All correspondence is available to the public. For a full list, contact the Conservation Agent at concomm@town.arlington.ma.us.

#### **ATTACHMENTS:**

	Туре	File Name	Description
ם	Reference Material	Coalition_to_Save_the_Mugar_Wetlands _Con_Comm_Letter_216.pdf	Coalition to Save the Mugar Wetlands - Con Comm Letter 216.pdf
D	Reference Material	Coalition_to_Save_the_Mugar_Wetlands _Thorndike_Place_Hearing_Feb16th _Follow-up.pdf	Coalition to Save the Mugar Wetlands - Thorndike Place Hearing Feb. 16th - Follow-up.pdf
ם	Reference Material	Dave_RogersThorndike_Place_Letter_2-15.pdf	Dave Rogers - Thorndike Place Letter 2- 15.pdf



February 16, 2024

To Members of the Conservation Commission:

Regarding the Conservation Commission hearing on Thursday, February 15<sup>th</sup> of the proposed Thorndike Place development, we would like to address the questions raised by the Conservation Commission pertaining to stormwater reports and additional groundwater level testing. We respectfully ask that the Con Comm be precise in their written requirements of the Applicant to include the following:

- With several wells already installed on the site, it needs to be certain that at least one well be located within the footprint of the infiltration system.
- The wells shall be monitored either on-site (witnessed by the Town and/or its agent) or digitally (paired with a Town official and/or its agent).
- The wells need to be monitored in the spring months (March, April, May) when seasonal high groundwater levels are likely to be at their highest.
- A clear timeline needs to be established as to how often the wells will be monitored.
- The most conservative results must be used.
- The Applicant needs to respond as to why their calculations provided in the Stormwater Report for the primary infiltration structure were based on a duration of 0.046 days or 1.1 hours, whereas MADEP Stormwater Standards require a minimum of 24-hours.
- The Stormwater Report for the primary infiltration structure needs to be revised using the required minimum of 24-hours.

Thank you on Behalf of the Coalition to Save the Mugar Wetlands,

Jeanette Cummings, 32 Dorothy Rd. Julie DiBiase, 29 Littlejohn St.

Cc: James Feeney, Arlington Town Manager
David Morgan, Environmental Planner/Conservation Agent
Ryan Clapp, Conservation Agent
Arlington Select Board
Arlington Land Trust

#### Thorndike Place Hearing Feb. 16th - Follow-up

#### Coalition to Save the Mugar Wetlands <savethemugarwetlands@gmail.com>

Fri 2/16/2024 5:38 PM

To:ConComm < ConComm@town.arlington.ma.us>

Cc:SBadmin <SBadmin@town.arlington.ma.us>;Jim Feeney <jfeeney@town.arlington.ma.us>;info@arlingtonlandtrust.org <info@arlingtonlandtrust.org>

1 attachments (30 KB)

Con Comm Letter 216.docx;

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

To Members of the Conservation Commission:

Attached please find our response to the Feb. 15th hearing of the proposed Thorndike Place project.

Thank you,

Jeanette Cummings 32 Dorothy Rd.

Julie DiBiase 29 Littlejohn St.

On Behalf of the Coalition to Save the Mugar Wetlands



# The Commonwealth of Massachusetts

#### HOUSE OF REPRESENTATIVES STATE HOUSE, BOSTON 02133-1054

STATE HOUSE, ROOM 544 TEL: (617) 722-2637 Dave Rogers@MAhouse.gov

#### To the members of the Arlington Conservation Commission,

I write to you today in my capacity as the state representative whose district encompasses the site of the proposed Thorndike Place development. Along with the Arlington Town Meeting, the Select Board, and the overwhelming majority of residents, I have expressed my opposition to this project in the past. I continue to respect and appreciate the work that the commission does daily to protect our environment and residents.

Some alarming recent developments compel me to offer additional testimony. As you well know, two separate studies have found irregularities in water level data submitted by the applicant to the commission. These studies show that the applicant has potentially underestimated groundwater levels during major storm events by using incorrect modeling, sited test pits in the wrong location, and failed to offer data on groundwater during the wettest months of the year. In doing so, the applicant appears to have contravened standard stormwater procedures offered by MADEP. These findings cast doubt on whether the proposed stormwater management system will function as intended, or indeed whether any adequate stormwater management system can be designed.

The site of the proposed development is located within a FEMA flood plain, and this area of town has had issues with flooding. A development with an inadequate stormwater design will be an extremely serious problem for the neighborhood, particularly in light of projected precipitation increases as our climate changes. As such, I respectfully request that the Conservation Commission follow Mr. Horsley's recommendations and require the developer to comply with all procedures established by MADEP and continue to ensure that every effort is made under the law to protect our environment and the community.

Thank you again for your consideration of this important matter.

Sincerely,

Dave Rogers

State Representative

24th Middlesex District (Arlington, Belmont, Cambridge)





# Town of Arlington, Massachusetts

## Water Bodies Working Group.

#### Summary:

Water Bodies Working Group.

1. Review and approval of FY25 Budget.

#### ATTACHMENTS:

Type File Name Description

Reference WB\_Budget\_2024.pdf WB Budget 2024.pdf

	A	В	J	K	М	N	0	Р	Q	R	S
1	Water Bodies Working Gr	oup Account History									
2	Version Date: 03.05.24				Net Available F	und Balance					47,047.66
3											
4											
5			FY18	FY19	FY21	FY22	FY23	FY23	FY24	FY24	FY25
6	MUNIS		Actual	Actual	Actual	Actual	Budget	Actual	Budget	Actual	Budget
7		Revenue/Appropriation	0.00	60,000.00	0.00	50,000.00	15,000.00	15,000.00	50,000.00	50,000.00	120,000.00
8	32315-578044	Revenue/Donations	1,450.00	4,376.24	1,800.00	1,800.00	1,800.00	2,300.00		3,800.00	
9		Annual Budget	4.34	10,653.45	67,771.14	16,290.00		36,975.00			
10		Carry forward - Revolving Funds	64,105.85	77,205.19	25,324.68	60,019.24	93,095.82	77,313.61	64,687.16	64,687.16	47,047.66
11											
12		Beginning Balance - 7/1	65,560.19	152,234.88	94,895.82	128,109.24	109,895.82	131,588.61	114,687.16	118,487.16	167,047.66
13											
15											
16		Expenses - Spy Pond	10,155.00	19,075.00	(34,076.31)	(12,875.00)	(35,000.00)	(38,303.15)	(35,000.00)	(21,290.28)	(70,000.00)
17		Expenses - Reservoir	15,000.00	15,000.00	(24,840.00)	0.00	(25,000.00)	(26,000.00)	(26,000.00)	(26,000.00)	(55,000.00)
18		Expenses - Hills	3,017.00	3,511.90	(4,670.27)	(945.63)	(5,000.00)	(2,563.30)	(5,000.00)	(5,090.00)	(6,000.00)
19		Expenses - McClennen	4,529.55	12,580.45	0.00	0.00	0.00	0.00	(5,000.00)	0.00	(5,000.00)
20	32315-578044	Expenses - CC Other	0.00	0.00	0.00	0.00	(5,000.00)	(35.00)	(5,000.00)	0.00	(5,000.00)
21		Encumbrances								(19,059.22)	
22											
23		Total Expenses	32,701.55	50,167.35	(63,586.58)	(13,820.63)	(70,000.00)	(66,901.45)	(76,000.00)	(71,439.50)	(141,000.00)
24											
25		Ending Balance - 6/30	32,858.64	102,067.53	31,309.24	114,288.61	39,895.82	64,687.16	38,687.16	47,047.66	26,047.66
26											
28											
29		Net Available Fund Balance				114,288.61	39,895.82	64,687.16	38,687.16	47,047.66	26,047.66
30											



## **Town of Arlington, Massachusetts**

## DEP #091-0357: Notice of Intent: 51 Burch Street (Continuation from 2/15/2024).

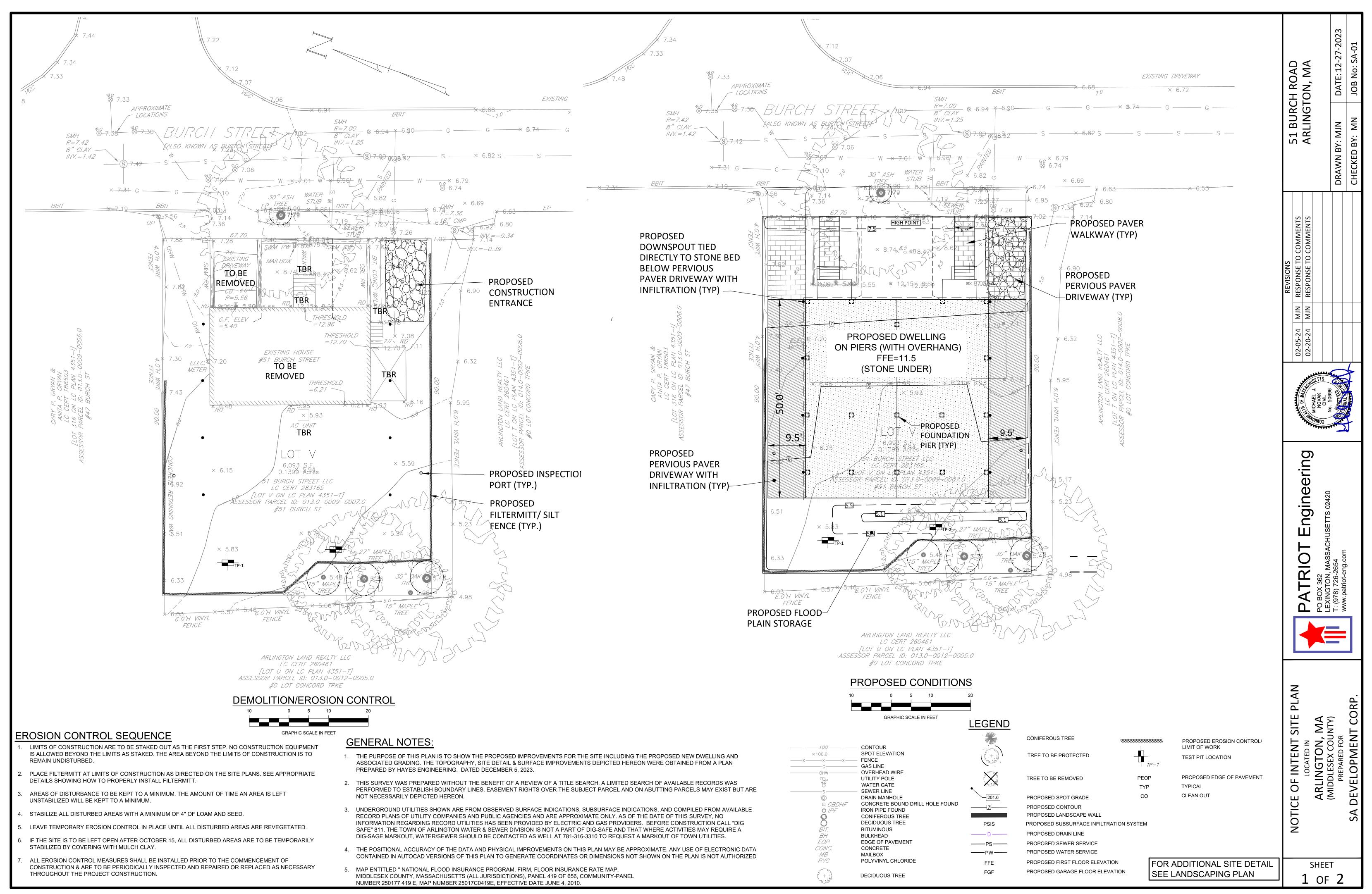
#### Summary:

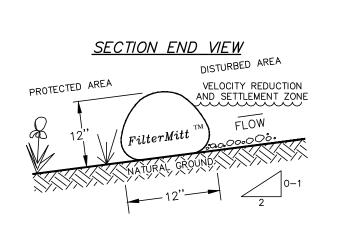
DEP #091-0357: Notice of Intent: 51 Burch Street (Continuation from 2/15/2024).

This public hearing will consider a Notice of Intent to demolish a single-family dwelling and construct a two-family dwelling and associated site appurtenances at 51 Burch Street within Bordering Land Subject to Flooding.

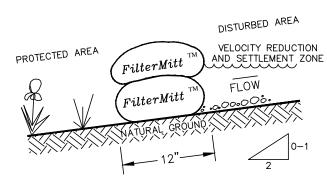
#### ATTACHMENTS:

	Type	File Name	Description
ם	Reference Material	51_Burch_NOI_Application.pdf	51 Burch NOI Application.pdf
ם	Reference Material	51_BURCH_Stormwater_Report.pdf	51 BURCH Stormwater Report.pdf





UNION END VIEW



## $FilterMitt^{^{ ext{TM}}}$ COMPONENTS

OUTSIDE CASING: 100% organic hessian. FILLER INGREDIENT:  $FiberRoot \ Mulch^{TM}$  A blend of coarse and fine compost and shredded wood.

Particle sizes: 100% passing a 3" screen; 90-100% passing a 1" screen; 70-100% passing a 0.75" screen; 30-75% passing a 0.25" screen.

Weight: Approx. 310 lbs./cu.yd.
(Ave. 11.5 lbs./l.f.)

FilterMitt TM INSTALLATION:

With the newest technology and equipment, sections can be constructed on site in lengths from 1' to 100'.

Sections can also be delivered to the site in lengths from 1' to

Sections can also be delivered to the site in lengths from 1' to 8'.

The flexibility of allows it to conform to any contour or terrain while holding a slightly round shape at 8" high by 8" wide.

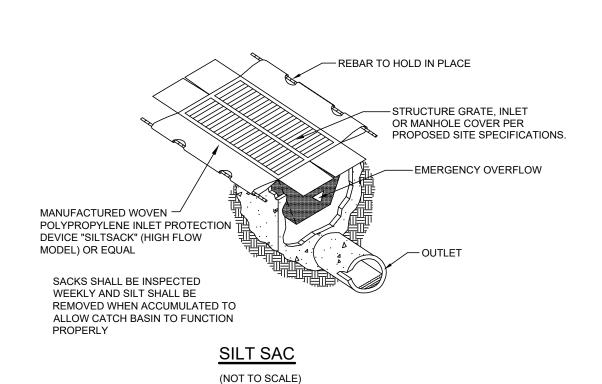
SECTION TOP VIEW

UNION TOP VIEW

Where section ends meet, there shall be an overlap of 6" or greater.

# FILTERMITT 2:1 SLOPES OR LESS

(NOT TO SCALE)



# TEST PIT DATA

SOIL TEST PERFORMED BY
MICHAEL NOVAK PE (PE#50696)
DATED NOVEMBER 8, 2023

TEST PIT TP-1 ELEVATION = 5.8

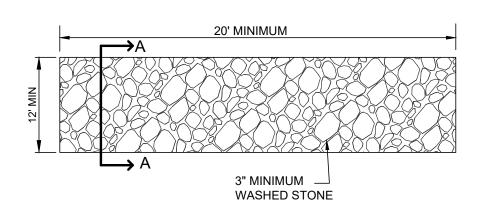
0"-9 " A LOAM 9"-34" B SILT LOAM 34"-95" C SILT LOAM

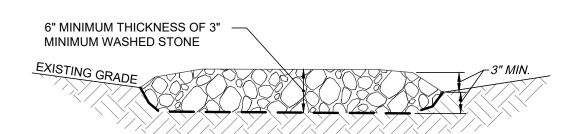
ESHGW OBSERVED AT 64" EL=0.46 (WEEPING) NO MOTTLES OBSERVED ABOVE ELEV. 0.46

TEST PIT TP-2 ELEVATION = 5.5

0"-10 " A LOAM 10"-30" B SILT LOAM 30"-84" C SILT LOAM

ESHGW OBSERVED AT 64" EL=0.16 (WEEPING) NO MOTTLES OBSERVED ABOVE ELEV. 0.16

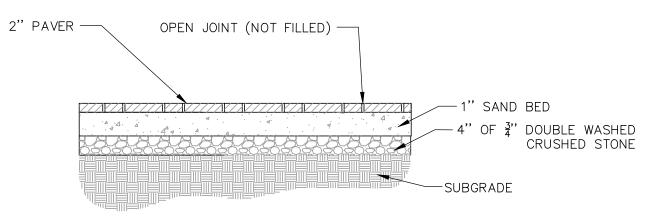




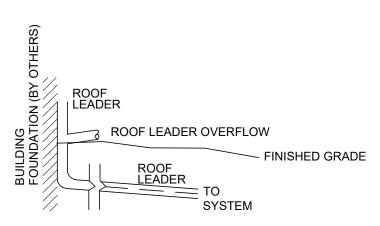
**PLAN VIEW** 

SECTION A-A
CONSTRUCTION ENTRANCE

(NOT TO SCALE)



PAVER DETAIL FOR WALKWAYS(TYP)



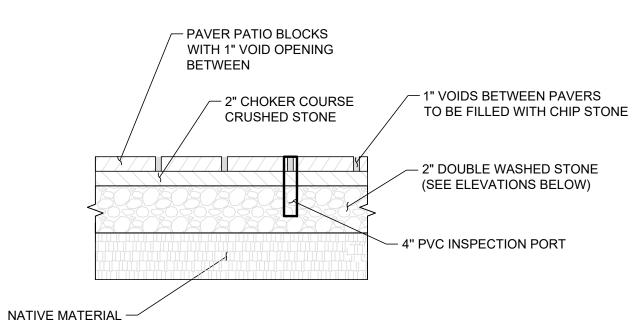
# PROPOSED ROOF LEADER CONNECTION

# IMPERVIOUS SUMMARY CHART

<b>IMPERVIOUS AREA SUMMARY</b>	<b>EXISTING</b>	PROPOSED	ALTERATION	
BUILDING	1,116	2,300	1,184	SF
DRIVE	354	1,348	994	SF
WALK		664	664	SF
TOTAL	1,470	4,312	2,842	SF

# FLOOD STORAGE CHART

FLOOD PLAIN SUMMARY	PROPOS	ED FILL	PROPOSE	ED STORAGE	RATIO
FLOOD ELEV	AREA OF FILL	VOLUME(cf)	<u>AREA</u>	VOLUME(cf)	
5.3-5.5	168	33.6	302	91	2.7
5.5-6.0	187	93.5	597	299	3.2
6.0-7.0	7	7	955	955	136.4



# PROPOSED POROUS PAVER DRIVEWAY DETAIL

# PROPOSED ELEVATIONS TOP OF STONE: 5.9 BOTTOM OF STONE: 2.5

MIN 3.4' DEPTH OF STONE IN ALL PLACES

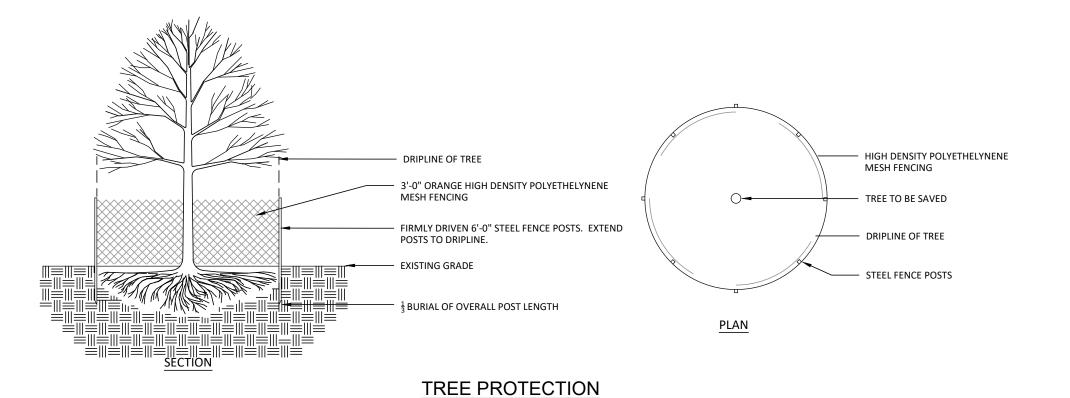
# PROPOSED STORAGE

TOP OF STONE: 5.9
BOTTOM OF STONE: 2.5
MIN 3.4' DEPTH OF STONE IN ALL PLACES

TOTAL AREA PROVIDED ON EACH DRIVE = 9.5'X50' = 475 SF TOTAL STORAGE PROVIDED IN EACH DRIVE = 475'\*3.4=1,615 CF

# STORMWATER NOTES

- 1. THE ENGINEERING DIVISION AND DESIGN ENGINEER SHALL BE NOTIFIED TO PERFORM INSPECTIONS OF 1) BOTTOM OF SYSTEM AND 2) SYSTEM AFTER INSTALLATION BUT BEFORE BACKFILL. FOR THE PROPOSED BIORETENTION BASINS, THE ENGINEERING DIVISON SHALL CONSIDER "SYSTEM AFTER INSTALLATION BUT BEFORE BACKFILL" TO INCLUDE THE INSTALLATION OF CRUSHED STONE AND APPLICABLE INSPECTION PORT, BUT BEFORE BACKFILL WITH BIORETENTIO SOIL. THESE INSPECTIONS REPRESENT THE MINIMUM REQUIREMENT OF THE TOWN TO SATISFY THE MAJOR PERMIT REQUIREMENTS AND THE DESIGN ENGINEER MAY STIPULATE ADDITIONAL INSPECTIONS AS APPROPRIATE FOR THEIR OWN REVIEW.
- 2. AN AS-BUILT PLAN SHOWING THE STORMWATER MITIGATION FEATURES AND ALL IMPERVIOUS AREAS ON SITE FOLLOWING CONSTRUCTION SHALL BE PROVIDED TO ENGINEERING DIVISION IN ACCORDANCE WITH THE STORMWATER MANAGEMENT PERMIT APPROVAL (UPON ISSUANCE).
- 3. THE REQUIREMENT TO REMOVE ALL SEDIMENT OR PRODUCTS OF EROSION RELATED TO ON-SITE CONSTRUCTION ACTIVITIES FROM THE TOWN RIGHT-OF-WAY AND TO REQUIRE SWEEPING OF THE STREET WHEN NECESSARY.
- 4. RUNOFF SHOULD NOT BE DIRECTED ACROSS PROPERTY LINES.
- 5. SHOULD SUBSURFACE CONDITIONS NOT MATCH THE TEST HOLE DATA (I.E. LEDGE, INACCURATE GROUNDWATER ELEVATIONS, ETC.). AT MINIMUM, CONTRACTOR SHALL BE REQUIRED TO CONTRACT THE DESIGN ENGINEER AND THE ENGINEERING DIVISION TO REVIEW CONDITIONS AND POSSIBLE DESIGN ADJUSTMENTS.



# GENERAL NATIVE LANDSCAPE NOTES

- 1. NO LANDSCAPE CULTIVARS OR VARIETIES OF THESE NATIVE PLANTS ARE ALLOWED. WITHOUT PRIOR APPROVAL FROM THE CONSERVATION COMMISSION
- 2. ALL SAPLING TREES SHALL MEASURE 4-6+ FEET HIGH WITH 1-1.5" CALIPERS.
- 3. ALL SHRUBS SHALL MEASURE 2-3+ FEET HIGH. SAPLING TREES WILL BE SPACED 10-15+ FEET APART (ON CENTER), WHILE SHRUBS WILL BE PLANTED IN CLUSTERS WITH INDIVIDUALS SPACED 5+/- FEET APART (ON CENTER).
- 4. THE APPLICANT SHALL SUBMIT RECEIPT(S) FOR NATIVE PLANTINGS TO THE ARLINGTON CONSERVATION COMMISSION, AND THE NATIVE PLANTINGS WILL BE MONITORED FOR TWO (2) GROWING SEASONS FOLLOWING PLANTING TO DOCUMENT SURVIVAL.
- 5. ANNUAL MONITORING REPORTS SHALL BE SUBMITTED TO THE ARLINGTON CONSERVATION COMMISSION DOCUMENTING THE HEALTH OF THE PLANTS, INCLUDE REPRESENTATIVE PHOTOGRAPHS, AND DOCUMENT ANY REPLACEMENT PLANTS AND/OR MANAGEMENT EFFORTS NEEDED TO ENSURE SUCCESS.
- 6. A PLANTING PLAN DEPICTING THE LOCATION OF THE INSTALLED PLANTS SHALL BE PROVIDED TO THE CONSERVATION COMMISSION WITHIN 30 DAYS OF PLANTING.

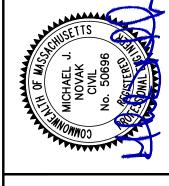
REVISIONS

O2-05-24 MJN RESPONSE TO COMMENTS

O2-19-24 MJN RESPONSE TO COMMENTS

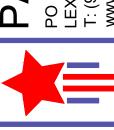
ARLINGTON, MA
ARLINGTON, MA
DATE: 12-2

CHECKED BY: MJN JOB NO: SA



0

ATRIOT Engineerii



SE OF INTENT SITE PLAN LOCATED IN ARLINGTON, MA (MIDDLESEX COUNTY)

SHEET 2 OF 2

# STORMWATER REPORT FOR 51 BURCH STREET ARLINGTON, MASSACHUSETTS

PREPARED FOR:
SA DEVELOPMENT
200F Main Street Box 352
Stoneham, MA 02180

# PREPARED BY:

PATRIOT Engineering, LLC
PO BOX 362
Lexington, Massachusetts 02420
(978)726-2654

DATE: December 27, 2023 Revised February 5, 2024 Revised February 20, 2024







Lexington, MA 02420

**VIA: EMAIL** 

December 27, 2023 Revised February 5, 2024 Revised February 20, 2024

Chairman Tirone and Members of the Conservation Commission Town of Arlington, Town Hall 730 Mass Ave. Annex Arlington, MA 02476

Re: 51 Burch Street

**Arlington, Massachusetts** 

Dear Ms. Chapnick & Members of the Commission:

Patriot Engineering LLC (Patriot) is pleased to submit this letter and accompanying documentation in support of a Notice of Intent application for the project at 51 Burch Street in Arlington. The proposed site improvements will involve the razing of an existing single-family dwelling and the construction of a two-family dwelling with associated pervious paver drives for each unit. The proposed structure will be constructed on foundation piers to accommodate the needed flood storage for the property.

The existing topography for the subject parcel results in water runoff to two (2) locations; the southern (side) property line and the western (rear) property line. These locations have been chosen as the design points for the stormwater analysis. The proposed site improvements will mostly mimic existing drainage patterns except that all runoff will be directed to the western (rear) property line. Through the addition of a pervious paver driveways with stone beneath designed to capture and infiltrate stormwater runoff from each roof area of the proposed dwelling; the stormwater runoff rates and volumes will not increase in the proposed conditions.

The HydroCAD analysis summary below shows that with the proposed mitigation efforts for the site improvements will not result in an increase in peak rate of stormwater surface runoff during the 2, 10, 50, and 100-year design storms.

DP-1/100				
	Existing	(Pre)	<u>Propo</u>	sed (Post)
Storm Event	Rate(cfs)	Volume(cf)	Rate(cfs)	Volume(cf)
2-Year (4.04 in./hr.)	0.10	219	0.00	0
10-Year (6.43 in./hr.)	0.10	440	0.00	0
25-Year (7.64 in./hr.)	0.20	557	0.00	0
100-Year (11.5 in./hr.)	0.30	945	0.00	0

DP-2/200					
	Existing	(Pre)	Proposed (Post)		
Storm Event	Rate(cfs)	Volume(cf)	Rate(cfs)	Volume(cf)	
2-Year (4.04 in./hr.)	0.30	1,001	0.20	508	
10-Year (6.43 in./hr.)	0.50	1,891	0.30	959	
25-Year (7.64 in./hr.)	0.60	2,356	0.40	1,194	
100-Year (11.5 in./hr.)	1.00	3,865	0.90	2,480	

#### Accompanying this letter is:

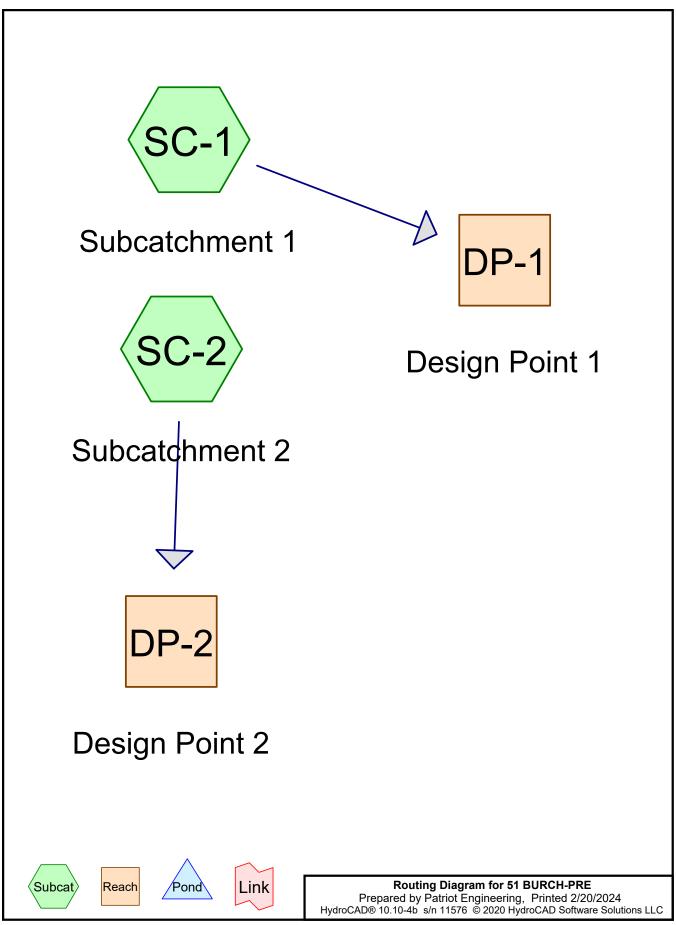
- A "Site Plan of Land" dated Revised February 20, 2024;
- "Stormwater Analysis and Calculations for 51 Burch Street" Revised February 20, 2024;
- A copy of the NRCS Soil Map showing the soil classification of that located on the locus property.
- An "Operation & Maintenance Program" dated Revised February 20, 2024.

We anticipate this information meets the requirements of the Town of Arlington Conservation Commission. Should you have any questions or require any further details, please feel welcome to email at <a href="mailto:mnovak@patriot-eng.com">mnovak@patriot-eng.com</a>

Sincerely,

**PATRIOT Engineering LLC,** 

Michael J Novak, P.E.



## **Rainfall Events Listing**

Event#	Event	vent Storm Type		Mode	Mode Duration		Depth	AMC
	Name				(hours)		(inches)	
1	2-Yr 24 Hr	Type III 24-hr		Default	24.00	1	4.04	2
2	10-Yr 24 Hr	Type III 24-hr		Default	24.00	1	6.43	2
3	25-Yr 24 Hr	Type III 24-hr		Default	24.00	1	7.64	2
4	100-Yr 24 Hr	Type III 24-hr		Default	24.00	1	11.50	2

#### **51 BURCH-PRE**

Prepared by Patriot Engineering
HydroCAD® 10.10-4b s/n 11576 © 2020 HydroCAD Software Solutions LLC

Printed 2/20/2024

Page 3

## Area Listing (all nodes)

Area	CN	Description
(sq-ft)		(subcatchment-numbers)
4,623	80	>75% Grass cover, Good, HSG D (SC-1, SC-2)
354	98	Driveway/Walkways/Patios (SC-2)
1,116	98	Roof (SC-2)
6,093	84	TOTAL AREA

Printed 2/20/2024

Page 4

## Soil Listing (all nodes)

Area	Soil	Subcatchment
(sq-ft)	Group	Numbers
0	HSG A	
0	HSG B	
0	HSG C	
4,623	HSG D	SC-1, SC-2
1,470	Other	SC-2
6,093		TOTAL AREA

#### **51 BURCH-PRE**

## Prepared by Patriot Engineering

HydroCAD® 10.10-4b s/n 11576 © 2020 HydroCAD Software Solutions LLC

Printed 2/20/2024

Page 5

## **Ground Covers (all nodes)**

 HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subcatchment Numbers
0	0	0	4,623	0	4,623	>75% Grass cover, Good	SC-1, SC-2
0	0	0	0	354	354	Driveway/Walkways/Patios	SC-2
0	0	0	0	1,116	1,116	Roof	SC-2
0	0	0	4,623	1,470	6,093	TOTAL AREA	

#### **51 BURCH-PRE**

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment SC-1: Subcatchment 1**Runoff Area=1,266 sf 0.00% Impervious Runoff Depth>2.07"

Tc=6.0 min CN=80 Runoff=0.1 cfs 219 cf

Subcatchment SC-2: Subcatchment 2 Runoff Area=4,827 sf 30.45% Impervious Runoff Depth>2.49"

Flow Length=212' Tc=11.4 min CN=85 Runoff=0.3 cfs 1,001 cf

Reach DP-1: Design Point 1 Inflow=0.1 cfs 219 cf

Outflow=0.1 cfs 219 cf

Reach DP-2: Design Point 2 Inflow=0.3 cfs 1,001 cf

Outflow=0.3 cfs 1,001 cf

Total Runoff Area = 6,093 sf Runoff Volume = 1,220 cf Average Runoff Depth = 2.40"

75.87% Pervious = 4,623 sf 24.13% Impervious = 1,470 sf

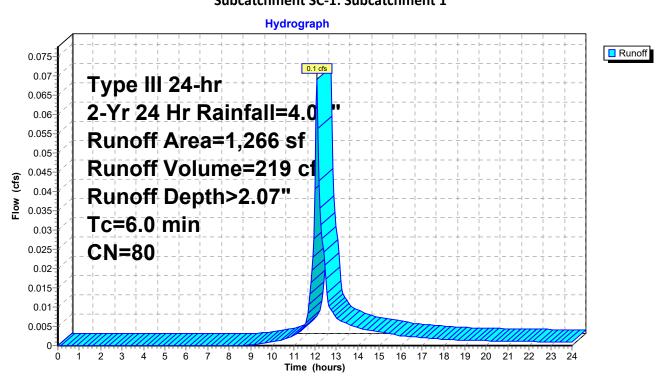
#### Summary for Subcatchment SC-1: Subcatchment 1

Runoff = 0.1 cfs @ 12.09 hrs, Volume= 219 cf, Depth> 2.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 2-Yr 24 Hr Rainfall=4.04"

	Α	rea (sf)	CN E	Description	escription							
_		1,266	80 >	75% Grass	75% Grass cover, Good, HSG D							
		1,266	1,266 100.00% Pervious Area									
_	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description						
-	6.0					Direct Entry, Min. Engineering Practice						

### Subcatchment SC-1: Subcatchment 1



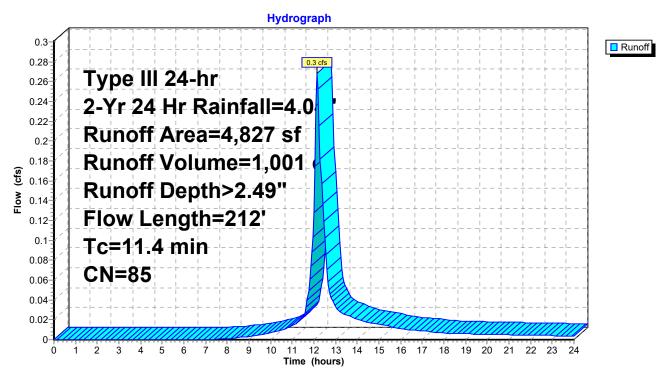
#### **Summary for Subcatchment SC-2: Subcatchment 2**

Runoff = 0.3 cfs @ 12.16 hrs, Volume= 1,001 cf, Depth> 2.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 2-Yr 24 Hr Rainfall=4.04"

	Area (sf	)	CN	Description		
	3,35	7	80	>75% Grass	cover, Goo	d, HSG D
*	354	4	98	Driveway/W	/alkways/Pa	atios
*	1,11	ŝ	98	Roof		
	4,82	7	85	Weighted A	verage	
	3,35	7		69.55% Perv	ious Area	
	1,47	)		30.45% Imp	ervious Are	a
	Tc Leng	th	Slop	e Velocity	Capacity	Description
(mi	n) (fee	t)	(ft/f	:) (ft/sec)	(cfs)	
2	.5 2	21	0.020	0.1		Sheet Flow,
						Grass: Short n= 0.150 P2= 4.04"
7	.1 2	29	0.020	0.1		Sheet Flow,
						Woods: Light underbrush n= 0.400 P2= 4.04"
0	.7 5	0	0.060	0 1.2		Shallow Concentrated Flow,
						Woodland Kv= 5.0 fps
0	.8	76	0.105	0 1.6		Shallow Concentrated Flow,
						Woodland Kv= 5.0 fps
0	.3 3	36	0.200	0 2.2		Shallow Concentrated Flow,
						Woodland Kv= 5.0 fps
11	.4 21	.2	Total			

#### **Subcatchment SC-2: Subcatchment 2**



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#### Summary for Reach DP-1: Design Point 1

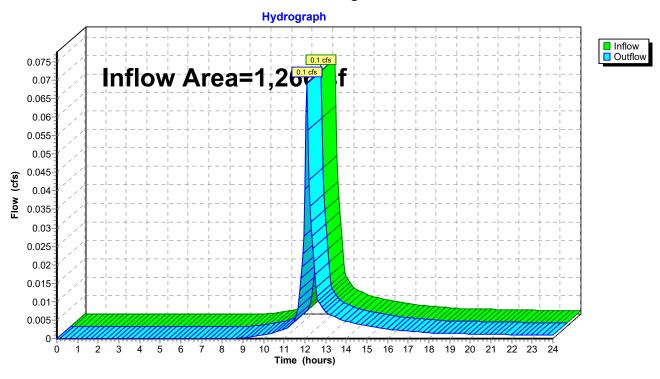
Inflow Area = 1,266 sf, 0.00% Impervious, Inflow Depth > 2.07" for 2-Yr 24 Hr event

Inflow = 0.1 cfs @ 12.09 hrs, Volume= 219 cf

Outflow = 0.1 cfs @ 12.09 hrs, Volume= 219 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

#### Reach DP-1: Design Point 1



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#### Summary for Reach DP-2: Design Point 2

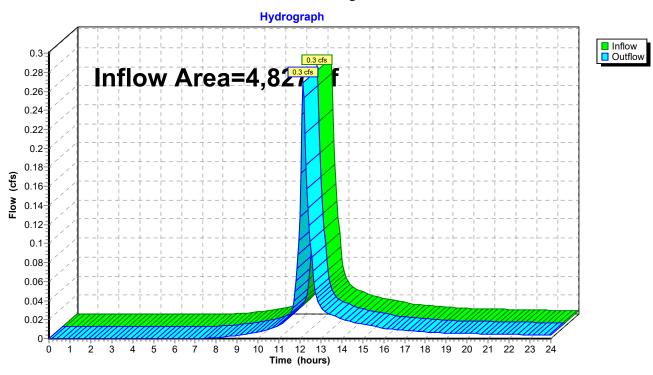
Inflow Area = 4,827 sf, 30.45% Impervious, Inflow Depth > 2.49" for 2-Yr 24 Hr event

Inflow = 0.3 cfs @ 12.16 hrs, Volume= 1,001 cf

Outflow = 0.3 cfs @ 12.16 hrs, Volume= 1,001 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

#### Reach DP-2: Design Point 2



#### **51 BURCH-PRE**

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment SC-1: Subcatchment 1** Runoff Area=1,266 sf 0.00% Impervious Runoff Depth>4.17"

Tc=6.0 min CN=80 Runoff=0.1 cfs 440 cf

Subcatchment SC-2: Subcatchment 2 Runoff Area=4,827 sf 30.45% Impervious Runoff Depth>4.70"

Flow Length=212' Tc=11.4 min CN=85 Runoff=0.5 cfs 1,891 cf

Reach DP-1: Design Point 1 Inflow=0.1 cfs 440 cf

Outflow=0.1 cfs 440 cf

Reach DP-2: Design Point 2 Inflow=0.5 cfs 1,891 cf

Outflow=0.5 cfs 1,891 cf

Total Runoff Area = 6,093 sf Runoff Volume = 2,331 cf Average Runoff Depth = 4.59" 75.87% Pervious = 4,623 sf 24.13% Impervious = 1,470 sf

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#### Summary for Subcatchment SC-1: Subcatchment 1

Runoff = 0.1 cfs @ 12.09 hrs, Volume= 440 cf, Depth> 4.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Yr 24 Hr Rainfall=6.43"

	Area (sf)	CN [	Description						
	1,266	80 >	>75% Grass cover, Good, HSG D						
	1,266	100.00% Pervious Area							
T (min	c Length ) (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description				
6.0	)				Direct Entry, Min. Engineering Practice				

# Subcatchment SC-1: Subcatchment 1

#### Hydrograph Runoff 0.15 0.1 cfs 0.14 Type III 24-hr 0.13 10-Yr 24 Hr Rainfall=6.4 0.12 0.11 Runoff Area=1,266 sf 0.1 Runoff Volume=440 cf 0.09 Runoff Depth>4.17" 0.08 0.07 Tc=6.0 min 0.06 CN=80 0.05 0.04 0.03 0.02 0.01 14 15 16 17 18 19 20 Time (hours)

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#### **Summary for Subcatchment SC-2: Subcatchment 2**

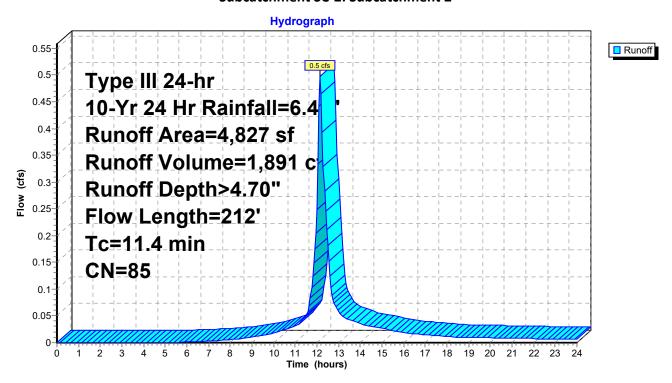
Runoff = 0.5 cfs @ 12.16 hrs, Volume= 1,891 cf, Depth> 4.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Yr 24 Hr Rainfall=6.43"

	Αı	rea (sf)	CN	Description		
		3,357	80	>75% Grass	cover, Goo	d, HSG D
*		354	98	Driveway/W	alkways/Pa	atios
*		1,116	98	Roof		
		4,827	85	Weighted Av	verage	
		3,357		69.55% Perv	ious Area	
		1,470		30.45% Impo	ervious Are	a
	Tc	Length	Slop	e Velocity	Capacity	Description
(m	in)	(feet)	(ft/f	t) (ft/sec)	(cfs)	
2	2.5	21	0.020	0 0.1		Sheet Flow,
						Grass: Short n= 0.150 P2= 4.04"
7	7.1	29	0.020	0 0.1		Sheet Flow,
						Woods: Light underbrush n= 0.400 P2= 4.04"
(	0.7	50	0.060	0 1.2		Shallow Concentrated Flow,
						Woodland Kv= 5.0 fps
(	0.8	76	0.105	0 1.6		Shallow Concentrated Flow,
						Woodland Kv= 5.0 fps
(	0.3	36	0.200	0 2.2		Shallow Concentrated Flow,
						Woodland Kv= 5.0 fps
11	1.4	212	Total			

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#### **Subcatchment SC-2: Subcatchment 2**



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#### Summary for Reach DP-1: Design Point 1

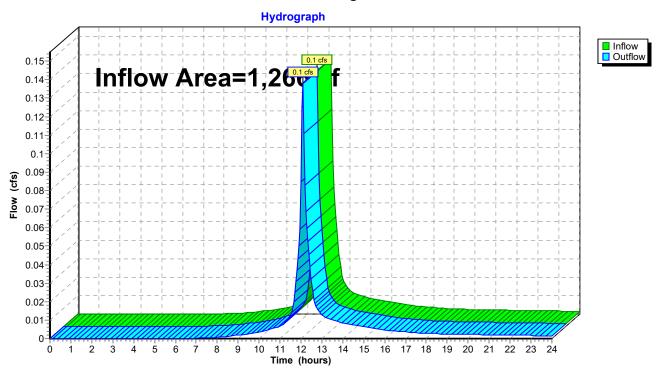
Inflow Area = 1,266 sf, 0.00% Impervious, Inflow Depth > 4.17" for 10-Yr 24 Hr event

Inflow = 0.1 cfs @ 12.09 hrs, Volume= 440 cf

Outflow = 0.1 cfs @ 12.09 hrs, Volume= 440 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

#### Reach DP-1: Design Point 1



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#### Summary for Reach DP-2: Design Point 2

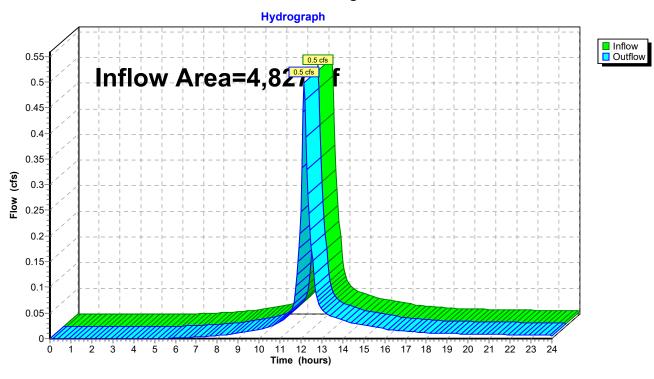
Inflow Area = 4,827 sf, 30.45% Impervious, Inflow Depth > 4.70" for 10-Yr 24 Hr event

Inflow = 0.5 cfs @ 12.16 hrs, Volume= 1,891 cf

Outflow = 0.5 cfs @ 12.16 hrs, Volume= 1,891 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

#### Reach DP-2: Design Point 2



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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment SC-1: Subcatchment 1** Runoff Area=1,266 sf 0.00% Impervious Runoff Depth>5.28"

Tc=6.0 min CN=80 Runoff=0.2 cfs 557 cf

Subcatchment SC-2: Subcatchment 2 Runoff Area=4,827 sf 30.45% Impervious Runoff Depth>5.86"

Flow Length=212' Tc=11.4 min CN=85 Runoff=0.6 cfs 2,356 cf

Reach DP-1: Design Point 1 Inflow=0.2 cfs 557 cf

Outflow=0.2 cfs 557 cf

Reach DP-2: Design Point 2 Inflow=0.6 cfs 2,356 cf

Outflow=0.6 cfs 2,356 cf

Total Runoff Area = 6,093 sf Runoff Volume = 2,913 cf Average Runoff Depth = 5.74" 75.87% Pervious = 4,623 sf 24.13% Impervious = 1,470 sf

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#### Summary for Subcatchment SC-1: Subcatchment 1

Runoff = 0.2 cfs @ 12.09 hrs, Volume= 557 cf, Depth> 5.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 25-Yr 24 Hr Rainfall=7.64"

	Area (sf)	CN [	Description						
	1,266	80 >	30 >75% Grass cover, Good, HSG D						
_	1,266	:	100.00% Pervious Area						
To (min)	- 0-	Slope (ft/ft)	•	Capacity (cfs)	Description				
6.0	)				Direct Entry, Min. Engineering Practice				

# Subcatchment SC-1: Subcatchment 1

#### Hydrograph Runoff 0.19 0.18 Type III 24-hr 0.17 0.16 25-Yr 24 Hr Rainfall=7.6 0.15 0.14 Runoff Area=1,266 sf 0.13 0.12 Runoff Volume=557 cf 0.11 Runoff Depth>5.28" 0.1 0.09 Tc=6.0 min 0.08 0.07 CN=80 0.06 0.05 0.04 0.03 0.02 0.01 15 16 17 Time (hours)

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#### **Summary for Subcatchment SC-2: Subcatchment 2**

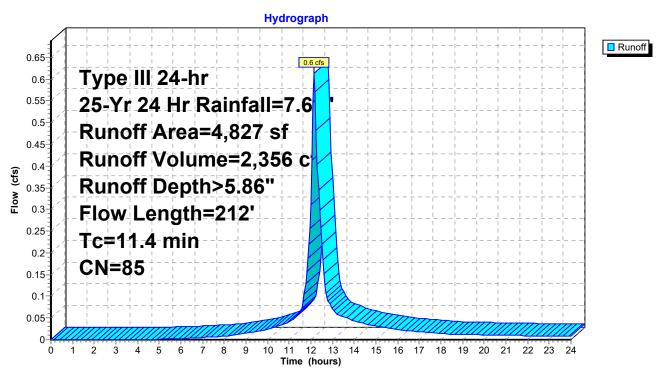
Runoff = 0.6 cfs @ 12.16 hrs, Volume= 2,356 cf, Depth> 5.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 25-Yr 24 Hr Rainfall=7.64"

	Area (sf) CN Description					
	3,35	7	80	75% Grass	cover, Goo	d, HSG D
*	35	4	98 1	Oriveway/W	alkways/Pa	atios
*	1,11	6	98 1	Roof	•	
_	4,82	7	85 <sup>1</sup>	Neighted A	verage	
	3,35	7		59.55% Perv	ious Area	
	1,47		3	30.45% Imp	ervious Are	a
				•		
	Tc Leng	th	Slope	Velocity	Capacity	Description
(mi	n) (fe	et)	(ft/ft	(ft/sec)	(cfs)	
2	5	21	0.0200	0.1		Sheet Flow,
						Grass: Short n= 0.150 P2= 4.04"
7	'. <b>1</b>	29	0.0200	0.1		Sheet Flow,
						Woods: Light underbrush n= 0.400 P2= 4.04"
C	.7	50	0.0600	1.2		Shallow Concentrated Flow,
						Woodland Kv= 5.0 fps
C	.8	76	0.1050	1.6		Shallow Concentrated Flow,
						Woodland Kv= 5.0 fps
C	.3	36	0.2000	2.2		Shallow Concentrated Flow,
						Woodland Kv= 5.0 fps
11	.4 2	12	Total	•		

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#### **Subcatchment SC-2: Subcatchment 2**



#### Summary for Reach DP-1: Design Point 1

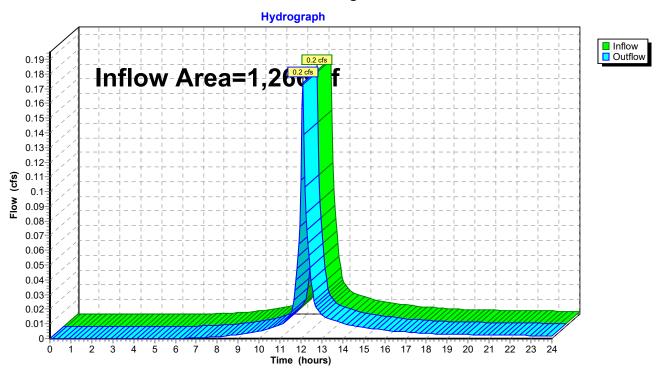
Inflow Area = 1,266 sf, 0.00% Impervious, Inflow Depth > 5.28" for 25-Yr 24 Hr event

Inflow = 0.2 cfs @ 12.09 hrs, Volume= 557 cf

Outflow = 0.2 cfs @ 12.09 hrs, Volume= 557 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

#### Reach DP-1: Design Point 1



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# Summary for Reach DP-2: Design Point 2

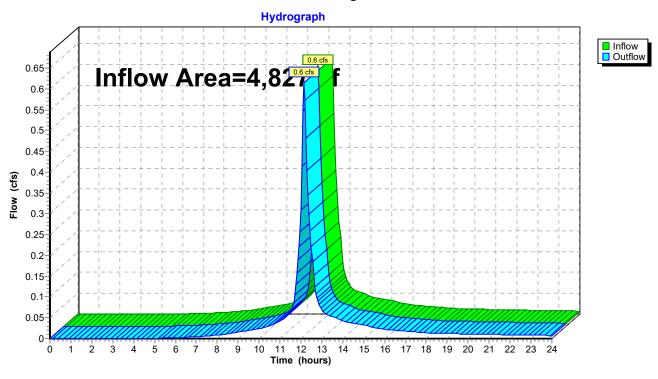
Inflow Area = 4,827 sf, 30.45% Impervious, Inflow Depth > 5.86" for 25-Yr 24 Hr event

Inflow = 0.6 cfs @ 12.16 hrs, Volume= 2,356 cf

Outflow = 0.6 cfs @ 12.16 hrs, Volume= 2,356 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## Reach DP-2: Design Point 2



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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment SC-1: Subcatchment 1** Runoff Area=1,266 sf 0.00% Impervious Runoff Depth>8.96"

Tc=6.0 min CN=80 Runoff=0.3 cfs 945 cf

Subcatchment SC-2: Subcatchment 2 Runoff Area=4,827 sf 30.45% Impervious Runoff Depth>9.61"

Flow Length=212' Tc=11.4 min CN=85 Runoff=1.0 cfs 3,865 cf

Reach DP-1: Design Point 1 Inflow=0.3 cfs 945 cf

Outflow=0.3 cfs 945 cf

Reach DP-2: Design Point 2 Inflow=1.0 cfs 3,865 cf

Outflow=1.0 cfs 3,865 cf

Total Runoff Area = 6,093 sf Runoff Volume = 4,810 cf Average Runoff Depth = 9.47" 75.87% Pervious = 4,623 sf 24.13% Impervious = 1,470 sf

# Summary for Subcatchment SC-1: Subcatchment 1

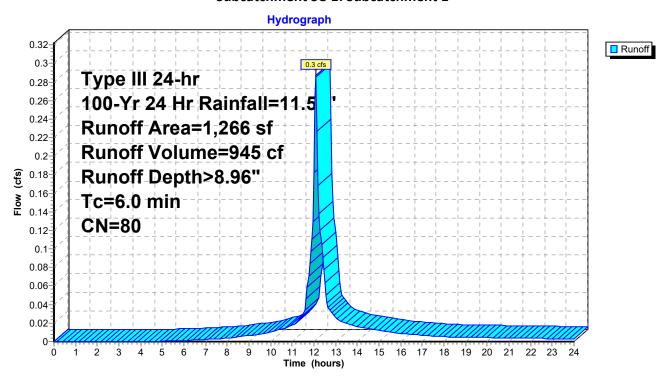
Runoff 0.3 cfs @ 12.09 hrs, Volume= 945 cf, Depth> 8.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 100-Yr 24 Hr Rainfall=11.50"

	Α	rea (sf)	CN	Description									
		1,266	80	>75% Grass cover, Good, HSG D									
-		1,266 100.00% Pervious Area											
	Tc (min)	Length (feet)	Slop (ft/ft	,	Capacity (cfs)	Description							
-	6.0					Direct Entry, Min. Engineering Practice							

**Direct Entry, Min. Engineering Practice** 

## Subcatchment SC-1: Subcatchment 1



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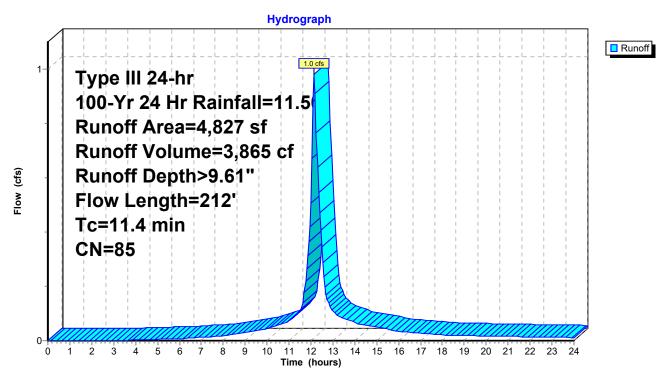
# **Summary for Subcatchment SC-2: Subcatchment 2**

Runoff = 1.0 cfs @ 12.15 hrs, Volume= 3,865 cf, Depth> 9.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 100-Yr 24 Hr Rainfall=11.50"

	Area (sf)	CN	Description					
	3,357	80	>75% Grass	cover, Goo	d, HSG D			
*	354	98	Driveway/W	alkways/Pa	atios			
*	1,116	98	Roof	•				
	4,827	85	Neighted A	verage				
3,357 69.55% Pervious Area								
	1,470		30.45% Imp	ervious Are	a			
			•					
Tc	Length	Slope	Velocity	Capacity	Description			
(min)	(feet)	(ft/ft	(ft/sec)	(cfs)				
2.5	21	0.0200	0.1		Sheet Flow,			
					Grass: Short n= 0.150 P2= 4.04"			
7.1	29	0.0200	0.1		Sheet Flow,			
					Woods: Light underbrush n= 0.400 P2= 4.04"			
0.7	50	0.0600	1.2		Shallow Concentrated Flow,			
					Woodland Kv= 5.0 fps			
0.8	76	0.1050	1.6		Shallow Concentrated Flow,			
					Woodland Kv= 5.0 fps			
0.3	36	0.2000	2.2		Shallow Concentrated Flow,			
					Woodland Kv= 5.0 fps			
11.4	212	Total						

### **Subcatchment SC-2: Subcatchment 2**



# Summary for Reach DP-1: Design Point 1

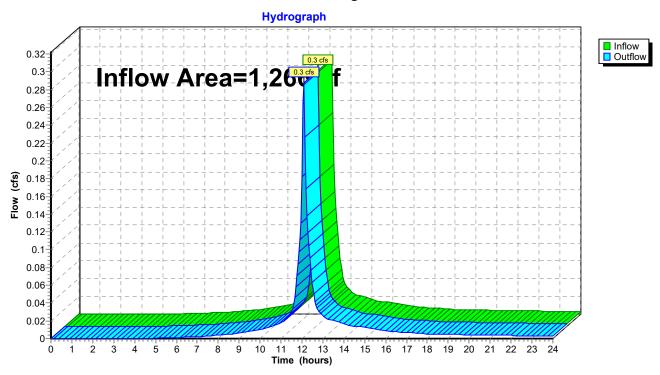
Inflow Area = 1,266 sf, 0.00% Impervious, Inflow Depth > 8.96" for 100-Yr 24 Hr event

Inflow = 0.3 cfs @ 12.09 hrs, Volume= 945 cf

Outflow = 0.3 cfs @ 12.09 hrs, Volume= 945 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## Reach DP-1: Design Point 1



# Summary for Reach DP-2: Design Point 2

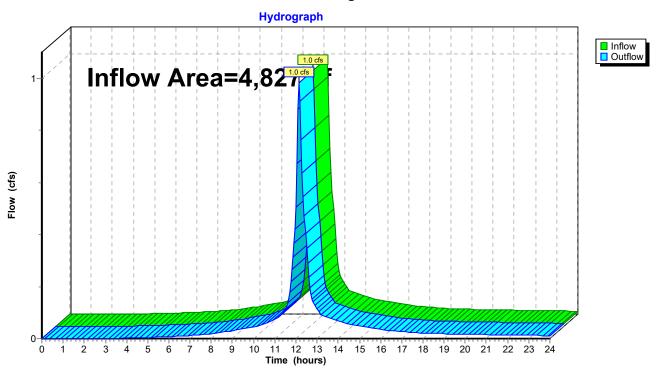
Inflow Area = 4,827 sf, 30.45% Impervious, Inflow Depth > 9.61" for 100-Yr 24 Hr event

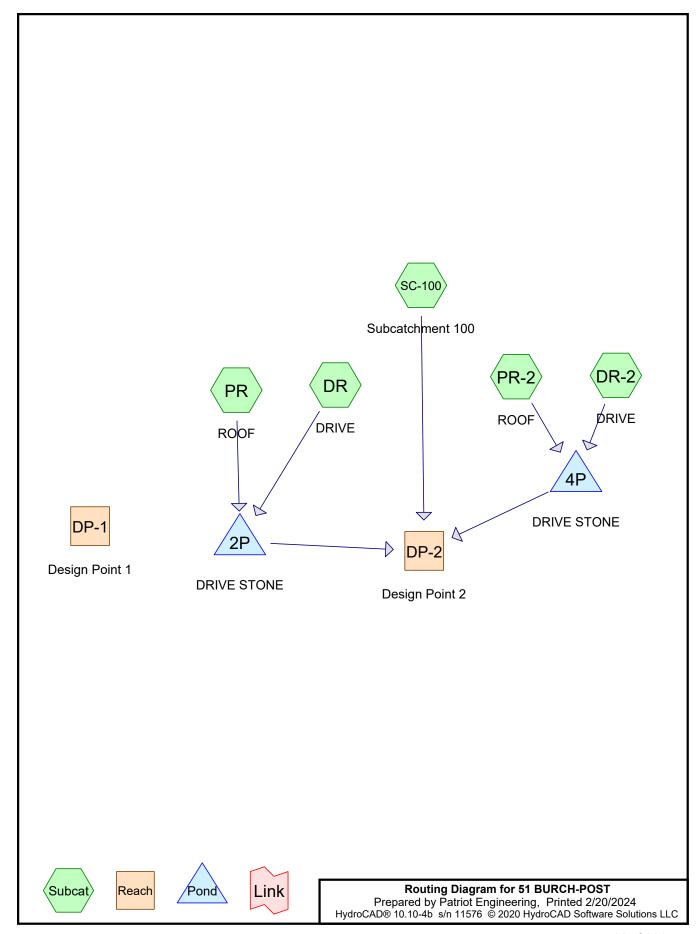
Inflow = 1.0 cfs @ 12.15 hrs, Volume= 3,865 cf

Outflow = 1.0 cfs @ 12.15 hrs, Volume= 3,865 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## Reach DP-2: Design Point 2





# **Rainfall Events Listing**

Event#	Event	Storm Type	Curve	Mode	Duration	B/B	Depth	AMC
	Name				(hours)		(inches)	
1	2-Yr 24 Hr	Type III 24-hr		Default	24.00	1	4.04	2
2	10-Yr 24 Hr	Type III 24-hr		Default	24.00	1	6.43	2
3	25-Yr 24 Hr	Type III 24-hr		Default	24.00	1	4.04	2
4	100-Yr 24 Hr	Type III 24-hr		Default	24.00	1	11.50	2
5	Custom	Type III 24-hr		Default	24.00	1	7.64	2

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# Area Listing (all nodes)

Area	CN	Description
(sq-ft)		(subcatchment-numbers)
1,781	80	>75% Grass cover, Good, HSG D (SC-100)
1,348	98	Paved parking, HSG D (DR, DR-2)
664	98	Pavers, HSG D (SC-100)
2,300	98	Roofs, HSG D (PR, PR-2)
6,093	93	TOTAL AREA

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# Soil Listing (all nodes)

Area	Soil	Subcatchment
(sq-ft)	Group	Numbers
0	HSG A	
0	HSG B	
0	HSG C	
6,093	HSG D	DR, DR-2, PR, PR-2, SC-100
0	Other	
6,093		TOTAL AREA

# **Ground Covers (all nodes)**

_	HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subcatchment Numbers
	0	0	0	1,781	0	1,781	>75% Grass cover, Good	SC-100
	0	0	0	1,348	0	1,348	Paved parking	DR, DR-2
	0	0	0	664	0	664	Pavers	SC-100
	0	0	0	2,300	0	2,300	Roofs	PR, PR-2
	0	0	0	6,093	0	6,093	TOTAL AREA	

#### **51 BURCH-POST**

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DR: DRIVE Runoff Area=674 sf 100.00% Impervious Runoff Depth>3.80"

Tc=6.0 min CN=98 Runoff=0.1 cfs 214 cf

Subcatchment DR-2: DRIVE Runoff Area=674 sf 100.00% Impervious Runoff Depth>3.80"

Tc=6.0 min CN=98 Runoff=0.1 cfs 214 cf

Subcatchment PR: ROOF Runoff Area=1,150 sf 100.00% Impervious Runoff Depth>3.80"

Tc=6.0 min CN=98 Runoff=0.1 cfs 364 cf

Subcatchment PR-2: ROOF Runoff Area=1,150 sf 100.00% Impervious Runoff Depth>3.80"

Tc=6.0 min CN=98 Runoff=0.1 cfs 364 cf

**Subcatchment SC-100: Subcatchment 100**Runoff Area=2,445 sf 27.16% Impervious Runoff Depth>2.49"

Tc=6.0 min CN=85 Runoff=0.2 cfs 508 cf

Reach DP-1: Design Point 1

Reach DP-2: Design Point 2 Inflow=0.2 cfs 508 cf

Outflow=0.2 cfs 508 cf

Pond 2P: DRIVE STONE Peak Elev=3.65' Storage=218 cf Inflow=0.2 cfs 578 cf

Discarded=0.0 cfs 577 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 577 cf

Pond 4P: DRIVE STONE Peak Elev=3.65' Storage=218 cf Inflow=0.2 cfs 578 cf

Discarded=0.0 cfs 577 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 577 cf

Total Runoff Area = 6,093 sf Runoff Volume = 1,664 cf Average Runoff Depth = 3.28" 29.23% Pervious = 1,781 sf 70.77% Impervious = 4,312 sf

# **Summary for Subcatchment DR: DRIVE**

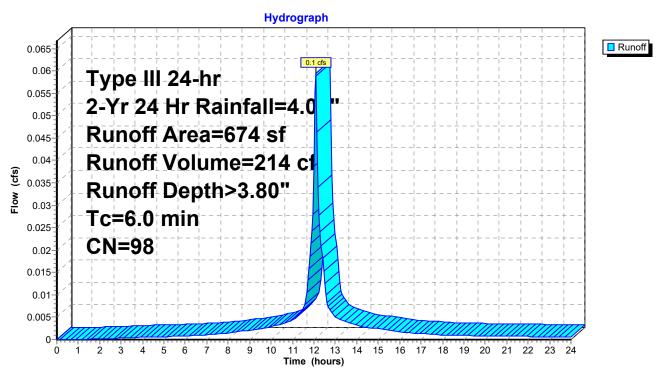
214 cf, Depth> 3.80" Runoff 0.1 cfs @ 12.09 hrs, Volume=

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 2-Yr 24 Hr Rainfall=4.04"

	А	rea (sf) CN Description										
_	674 98 Paved parking, HSG D											
	674 100.00% Impervious Area											
	Tc (min)	Length (feet)	Slope (ft/ft	Velocity (ft/sec)	Capacity (cfs)	Description						
-	6.0					Direct Entry, Min. Engineering Practice						

**Direct Entry, Min. Engineering Practice** 

## **Subcatchment DR: DRIVE**



# **Summary for Subcatchment DR-2: DRIVE**

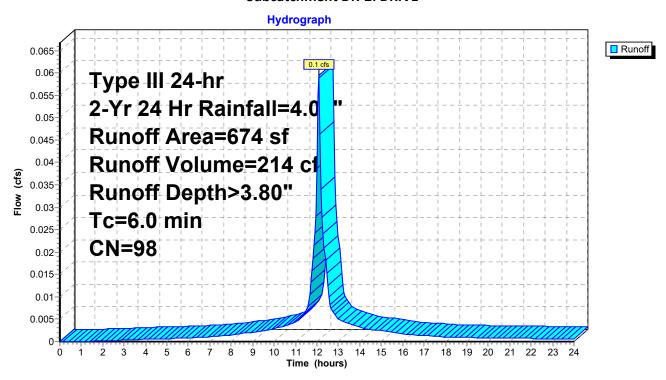
214 cf, Depth> 3.80" Runoff 0.1 cfs @ 12.09 hrs, Volume=

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 2-Yr 24 Hr Rainfall=4.04"

_	Α	rea (sf)	ea (sf) CN Description									
		674 98 Paved parking, HSG D										
		674 100.00% Impervious Area										
_	Tc (min)	Length (feet)	Slop (ft/ft	e Velocity ) (ft/sec)	Capacity (cfs)	Description						
	6.0	•			•	Direct Entry, Min. Engineering Practice						

# **Direct Entry, Min. Engineering Practice**

#### **Subcatchment DR-2: DRIVE**



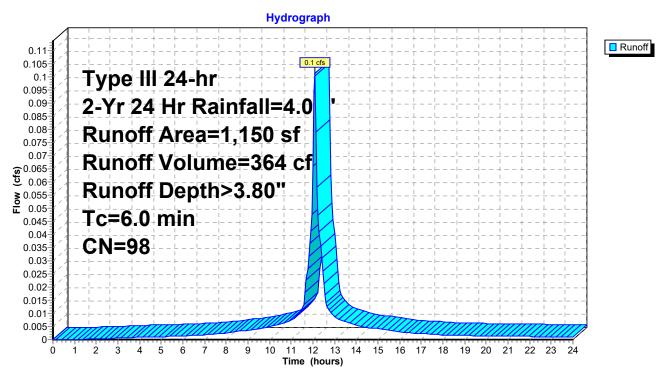
# **Summary for Subcatchment PR: ROOF**

Runoff = 0.1 cfs @ 12.09 hrs, Volume= 364 cf, Depth> 3.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 2-Yr 24 Hr Rainfall=4.04"

A	rea (sf)	CN	Description								
	1,150	98	Roofs, HSG [	)							
	1,150 100.00% Impervious Area										
Tc	Length		•		Description						
(min)	(feet)	(ft/ft	) (ft/sec)	(cfs)							
6.0					Direct Entry,						

## **Subcatchment PR: ROOF**



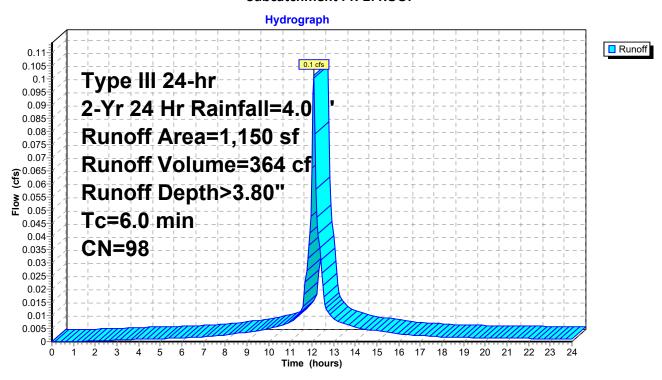
### **Summary for Subcatchment PR-2: ROOF**

Runoff = 0.1 cfs @ 12.09 hrs, Volume= 364 cf, Depth> 3.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 2-Yr 24 Hr Rainfall=4.04"

A	rea (sf)	CN [	Description						
	1,150	98 F	Roofs, HSG I	)					
	1,150		.00.00% Im <sub>l</sub>	pervious Ar					
Tc	Length		Velocity		Description				
(min)	(feet)	(ft/ft	(ft/sec)	(cfs)					
6.0					Direct Entry,				

## **Subcatchment PR-2: ROOF**



# Summary for Subcatchment SC-100: Subcatchment 100

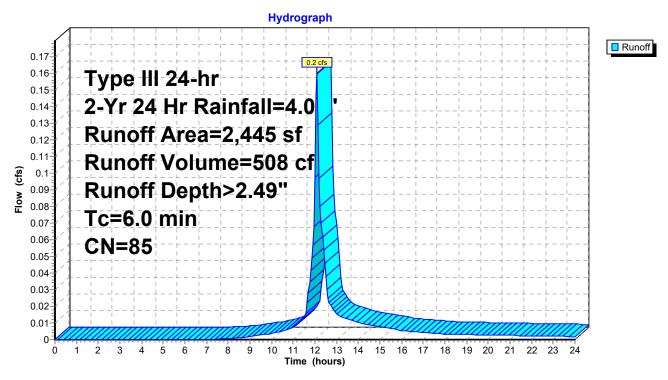
0.2 cfs @ 12.09 hrs, Volume= 508 cf, Depth> 2.49" Runoff

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 2-Yr 24 Hr Rainfall=4.04"

_	Α	rea (sf)	CN	Description		escription										
		1,266	80	>75% Grass	75% Grass cover, Good, HSG D											
		515	80	>75% Grass	75% Grass cover, Good, HSG D											
*		664	98	Pavers, HSG D												
		2,445	85	85 Weighted Average												
		1,781		72.84% Pervious Area												
		664		27.16% Imp	ervious Are	a										
	Tc	Length	Slop	e Velocity	Capacity	Description										
_	(min)	(feet)	(ft/f	t) (ft/sec)	(cfs)											
	6.0	Direct Entry, Min. Engineering Practice														

**Direct Entry, Min. Engineering Practice** 

#### Subcatchment SC-100: Subcatchment 100



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Summary for Reach DP-1: Design Point 1

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# Summary for Reach DP-2: Design Point 2

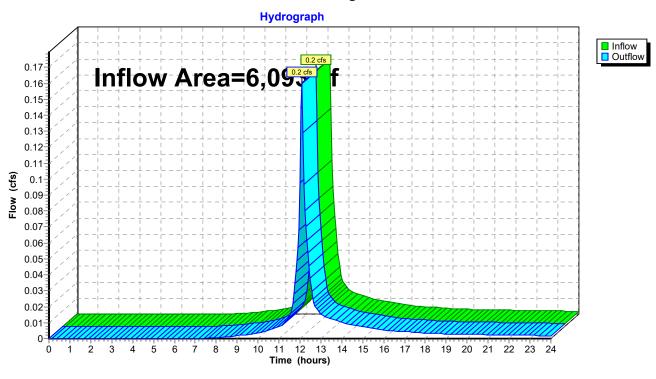
Inflow Area = 6,093 sf, 70.77% Impervious, Inflow Depth > 1.00" for 2-Yr 24 Hr event

Inflow = 0.2 cfs @ 12.09 hrs, Volume= 508 cf

Outflow = 0.2 cfs @ 12.09 hrs, Volume= 508 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## Reach DP-2: Design Point 2



#### **51 BURCH-POST**

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### **Summary for Pond 2P: DRIVE STONE**

Inflow Area = 1,824 sf,100.00% Impervious, Inflow Depth > 3.80" for 2-Yr 24 Hr event

Inflow = 0.2 cfs @ 12.09 hrs, Volume= 578 cf

Outflow = 0.0 cfs @ 12.96 hrs, Volume= 577 cf, Atten= 91%, Lag= 52.6 min

Discarded = 0.0 cfs @ 12.96 hrs, Volume= 577 cf Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Peak Elev= 3.65' @ 12.96 hrs Surf.Area= 475 sf Storage= 218 cf

Plug-Flow detention time= 119.2 min calculated for 577 cf (100% of inflow)

Center-of-Mass det. time= 118.2 min (869.6 - 751.3)

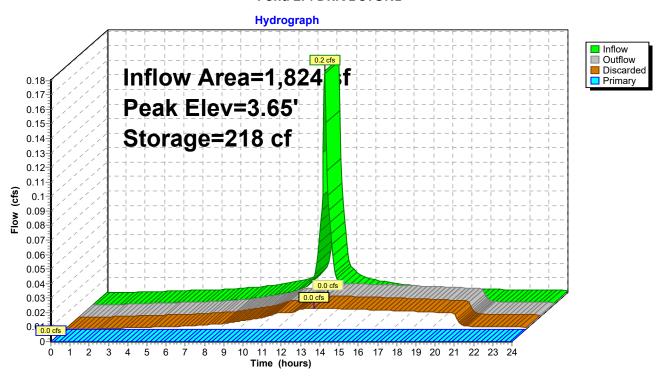
Volume	Inver	t Avai	il.Storage	Storage Description	on					
#1	2.50	)'	646 cf	<b>Custom Stage Data (Irregular)</b> Listed below (Recalc) 1,615 cf Overall x 40.0% Voids						
Elevation (fee		Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)				
2.	50	475	119.0	0	0	475				
5.9	90	475	119.0	1,615	1,615	880				
Device	Routing	Inv	ert Outle	et Devices						
#1	Discarded	2.	50' <b>1.02</b>	0 in/hr Exfiltration						
#2	Primary	Primary 5.85		ong (Profile 1) Bro	oad-Crested Rectan	gular Weir				
			Head	d (feet) 0.49 0.98	1.48					
			Coef	. (English) 2.92 3.3	37 3.59					

**Discarded OutFlow** Max=0.0 cfs @ 12.96 hrs HW=3.65' (Free Discharge) 1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=2.50' (Free Discharge) 2=Broad-Crested Rectangular Weir (Controls 0.0 cfs)

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#### **Pond 2P: DRIVE STONE**



#### **51 BURCH-POST**

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## **Summary for Pond 4P: DRIVE STONE**

Inflow Area = 1,824 sf,100.00% Impervious, Inflow Depth > 3.80" for 2-Yr 24 Hr event

Inflow = 0.2 cfs @ 12.09 hrs, Volume= 578 cf

Outflow = 0.0 cfs @ 12.96 hrs, Volume= 577 cf, Atten= 91%, Lag= 52.6 min

Discarded = 0.0 cfs @ 12.96 hrs, Volume= 577 cf Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Peak Elev= 3.65' @ 12.96 hrs Surf.Area= 475 sf Storage= 218 cf

Plug-Flow detention time= 119.2 min calculated for 577 cf (100% of inflow)

Center-of-Mass det. time= 118.2 min (869.6 - 751.3)

Volume	Inve	rt Avail	.Storage	Storage Descriptio	n				
#1	2.50	)'	646 cf	Custom Stage Data 1,615 cf Overall x		below (Recalc)			
Elevation (fee		Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)			
	50 90	475 475	119.0 119.0	0 1,615	0 1,615	475 880			
Device	Routing	Inve	ert Outle	et Devices					
#1 #2	Discarded Primary	5.85' <b>8.0' l</b>		O in/hr Exfiltration over Wetted area ong (Profile 1) Broad-Crested Rectangular Weir I (feet) 0.49 0.98 1.48					

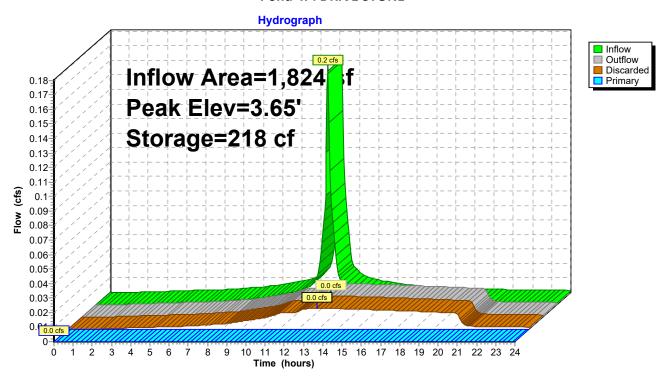
Discarded OutFlow Max=0.0 cfs @ 12.96 hrs HW=3.65' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.0 cfs)

Coef. (English) 2.92 3.37 3.59

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=2.50' (Free Discharge) 2=Broad-Crested Rectangular Weir (Controls 0.0 cfs)

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#### **Pond 4P: DRIVE STONE**



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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DR: DRIVE Runoff Area=674 sf 100.00% Impervious Runoff Depth>6.19"

Tc=6.0 min CN=98 Runoff=0.1 cfs 348 cf

Subcatchment DR-2: DRIVE Runoff Area=674 sf 100.00% Impervious Runoff Depth>6.19"

Tc=6.0 min CN=98 Runoff=0.1 cfs 348 cf

Subcatchment PR: ROOF Runoff Area=1,150 sf 100.00% Impervious Runoff Depth>6.19"

Tc=6.0 min CN=98 Runoff=0.2 cfs 593 cf

Subcatchment PR-2: ROOF Runoff Area=1,150 sf 100.00% Impervious Runoff Depth>6.19"

Tc=6.0 min CN=98 Runoff=0.2 cfs 593 cf

**Subcatchment SC-100: Subcatchment 100**Runoff Area=2,445 sf 27.16% Impervious Runoff Depth>4.71"

Tc=6.0 min CN=85 Runoff=0.3 cfs 959 cf

Reach DP-1: Design Point 1

Reach DP-2: Design Point 2 Inflow=0.3 cfs 959 cf

Outflow=0.3 cfs 959 cf

Pond 2P: DRIVE STONE Peak Elev=4.65' Storage=409 cf Inflow=0.3 cfs 941 cf

Discarded=0.0 cfs 881 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 881 cf

Pond 4P: DRIVE STONE Peak Elev=4.65' Storage=409 cf Inflow=0.3 cfs 941 cf

Discarded=0.0 cfs 881 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 881 cf

Total Runoff Area = 6,093 sf Runoff Volume = 2,840 cf Average Runoff Depth = 5.59"

29.23% Pervious = 1,781 sf 70.77% Impervious = 4,312 sf

# **Summary for Subcatchment DR: DRIVE**

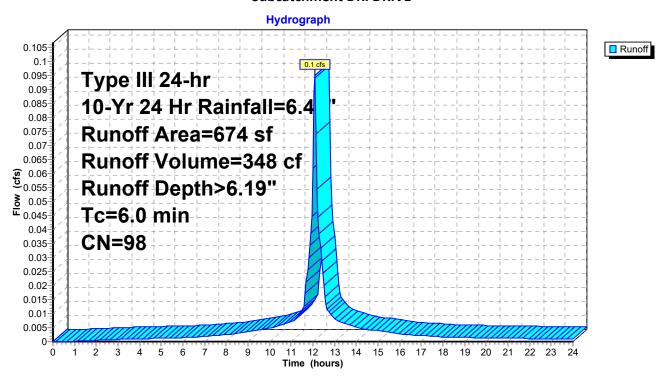
348 cf, Depth> 6.19" Runoff 0.1 cfs @ 12.09 hrs, Volume=

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Yr 24 Hr Rainfall=6.43"

_	Α	rea (sf)	CN D	escription		
		674	98 P	aved parkir	ng, HSG D	
-		674	1	.00.00% lmp	pervious Ar	rea
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
-	6.0		•		•	Direct Entry, Min. Engineering Practice

# **Direct Entry, Min. Engineering Practice**

## **Subcatchment DR: DRIVE**



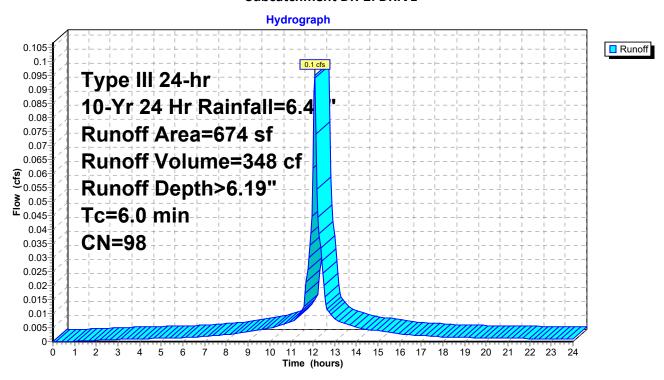
# **Summary for Subcatchment DR-2: DRIVE**

Runoff = 0.1 cfs @ 12.09 hrs, Volume= 348 cf, Depth> 6.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Yr 24 Hr Rainfall=6.43"

	Are	ea (sf)	CN	Description		
		674	98	Paved parkir	ng, HSG D	
		674		100.00% lm <sub>l</sub>	pervious Ar	rea
T (min		ength	Slop (ft/f	e Velocity ) (ft/sec)	Capacity (cfs)	Description
6.	0		•		•	Direct Entry, Min. Engineering Practice

#### **Subcatchment DR-2: DRIVE**



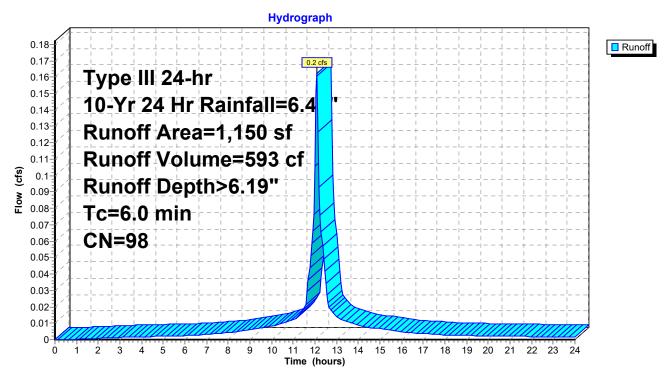
# **Summary for Subcatchment PR: ROOF**

Runoff = 0.2 cfs @ 12.09 hrs, Volume= 593 cf, Depth> 6.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Yr 24 Hr Rainfall=6.43"

A	rea (sf)	CN I	Description					
	1,150	98 I	Roofs, HSG [	)				
	1,150		L00.00% lmլ	pervious Ar	ea			
Тс	Length	Slope	Velocity	Capacity	Description			
(min)	(feet)	(ft/ft	(ft/sec)	(cfs)				
6.0					Direct Entry,			

## **Subcatchment PR: ROOF**



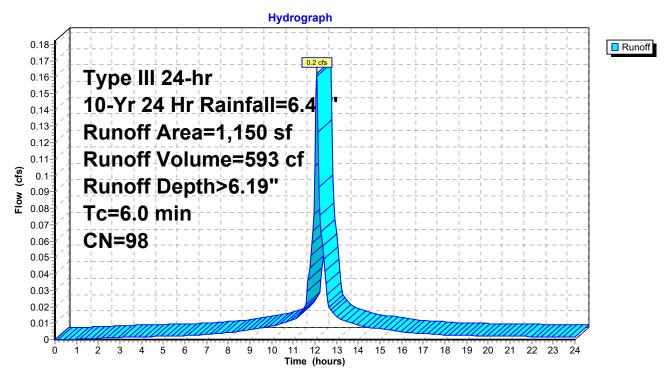
# **Summary for Subcatchment PR-2: ROOF**

Runoff = 0.2 cfs @ 12.09 hrs, Volume= 593 cf, Depth> 6.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Yr 24 Hr Rainfall=6.43"

A	rea (sf)	CN I	Description					
	1,150	98 I	Roofs, HSG [	)				
	1,150		L00.00% lmլ	pervious Ar	ea			
Тс	Length	Slope	Velocity	Capacity	Description			
(min)	(feet)	(ft/ft	(ft/sec)	(cfs)				
6.0					Direct Entry,			

## **Subcatchment PR-2: ROOF**



## Summary for Subcatchment SC-100: Subcatchment 100

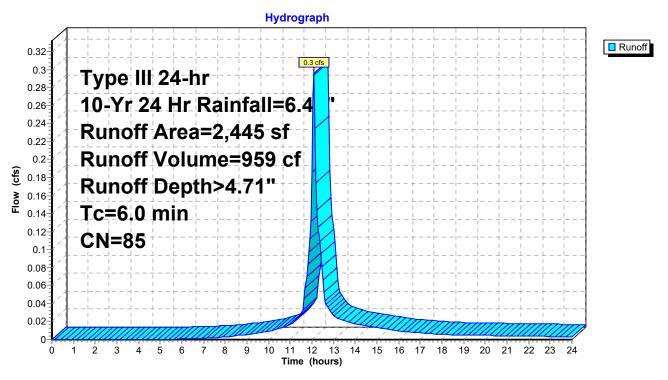
0.3 cfs @ 12.09 hrs, Volume= 959 cf, Depth> 4.71" Runoff

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Yr 24 Hr Rainfall=6.43"

_	Α	rea (sf)	CN	Description				
		1,266	80	>75% Grass	cover, Goo	d, HSG D		
		515	80	>75% Grass	cover, Goo	d, HSG D		
*	•	664	98	Pavers, HSG	D			
		2,445	85	Weighted A	verage			
		1,781		72.84% Perv	ious Area			
		664		27.16% lmp	ervious Are	a		
	_		C.I		6 ''			
	Tc	Length	Slop	e Velocity	Capacity	Description		
_	(min)	(feet)	(ft/f	t) (ft/sec)	(cfs)			
	6.0					Direct Entry,	Min. Engineering Practice	

**Direct Entry, Min. Engineering Practice** 

#### Subcatchment SC-100: Subcatchment 100



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Summary for Reach DP-1: Design Point 1

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# Summary for Reach DP-2: Design Point 2

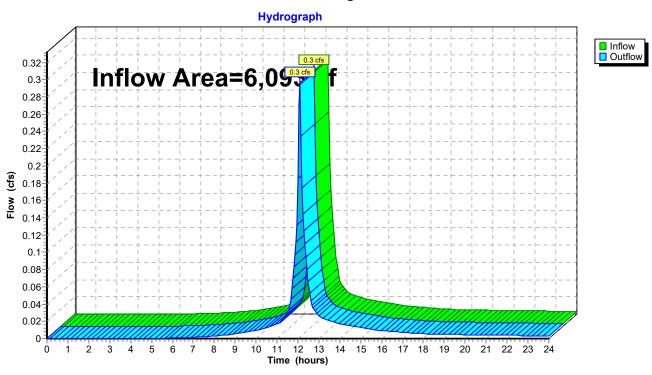
Inflow Area = 6,093 sf, 70.77% Impervious, Inflow Depth > 1.89" for 10-Yr 24 Hr event

Inflow = 0.3 cfs @ 12.09 hrs, Volume= 959 cf

Outflow = 0.3 cfs @ 12.09 hrs, Volume= 959 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## Reach DP-2: Design Point 2



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## **Summary for Pond 2P: DRIVE STONE**

1,824 sf,100.00% Impervious, Inflow Depth > 6.19" for 10-Yr 24 Hr event Inflow Area =

0.3 cfs @ 12.09 hrs, Volume= Inflow 941 cf

0.0 cfs @ 13.48 hrs, Volume= 881 cf, Atten= 93%, Lag= 83.6 min Outflow =

Discarded = 0.0 cfs @ 13.48 hrs, Volume= 881 cf Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Peak Elev= 4.65' @ 13.48 hrs Surf.Area= 475 sf Storage= 409 cf

Plug-Flow detention time= 212.9 min calculated for 881 cf (94% of inflow)

Center-of-Mass det. time= 177.4 min (921.1 - 743.7)

Volume	- 1	nvert	Avail.St	orage	Storage Descripti	Storage Description					
#1		2.50' 646 cf		Custom Stage Data (Irregular) Listed below (Recalc)							
					1,615 cf Overall	x 40.0% Voids					
Elevatio	on	Surf	.Area	Perim.	Inc.Store	Cum.Store	Wet.Area				
(fee	et)		(sq-ft)	(feet)	(cubic-feet)	(cubic-feet)	(sq-ft)				
2.5	50		475	119.0	0	0	475				
5.9	90		475 119.0		1,615	1,615	880				
Device	Routir	ng	Invert	Outle	et Devices						
#1	Discar	ded	2.50'	1.020	) in/hr Exfiltration	over Wetted area	1				
#2	Prima	ry	5.85'	8.0' l	ong (Profile 1) Bro	oad-Crested Recta	ngular Weir				

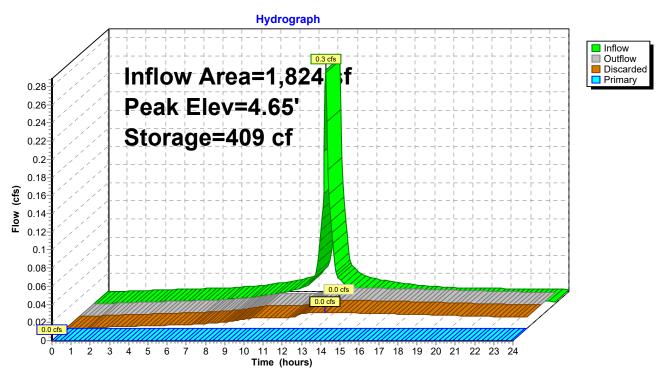
Head (feet) 0.49 0.98 1.48 Coef. (English) 2.92 3.37 3.59

Discarded OutFlow Max=0.0 cfs @ 13.48 hrs HW=4.65' (Free Discharge) 1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=2.50' (Free Discharge)

T\_2=Broad-Crested Rectangular Weir (Controls 0.0 cfs)

#### **Pond 2P: DRIVE STONE**



#### **51 BURCH-POST**

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# **Summary for Pond 4P: DRIVE STONE**

Inflow Area = 1,824 sf,100.00% Impervious, Inflow Depth > 6.19" for 10-Yr 24 Hr event

Inflow = 0.3 cfs @ 12.09 hrs, Volume= 941 cf

Outflow = 0.0 cfs @ 13.48 hrs, Volume= 881 cf, Atten= 93%, Lag= 83.6 min

Discarded = 0.0 cfs @ 13.48 hrs, Volume= 881 cf Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Peak Elev= 4.65' @ 13.48 hrs Surf.Area= 475 sf Storage= 409 cf

Plug-Flow detention time= 212.9 min calculated for 881 cf (94% of inflow)

Center-of-Mass det. time= 177.4 min (921.1 - 743.7)

Volume	In	vert	Avail.St	orage	Storage Descripti	Storage Description					
#1	2	2.50'	(	546 cf	Custom Stage Da	<b>ita (Irregular)</b> Liste	ed below (Recalc)				
					1,615 cf Overall	x 40.0% Voids					
Elevatio	on	Surf	.Area I	Perim.	Inc.Store	Cum.Store	Wet.Area				
(fee	et)	(	sq-ft)	(feet)	(cubic-feet)	(cubic-feet)	(sq-ft)				
2.5	50		475	119.0	0	0	475				
5.9	90		475 119.0		1,615	1,615	880				
Device	Routing	<u>g</u>	Invert	Outle	et Devices						
#1	Discard	led	2.50'	1.020	in/hr Exfiltration	over Wetted are	a				
#2	Primar	V	5.85'	8.0' l	ong (Profile 1) Bro	oad-Crested Recta	angular Weir				

Head (feet) 0.49 0.98 1.48
Coef. (English) 2.92 3.37 3.59

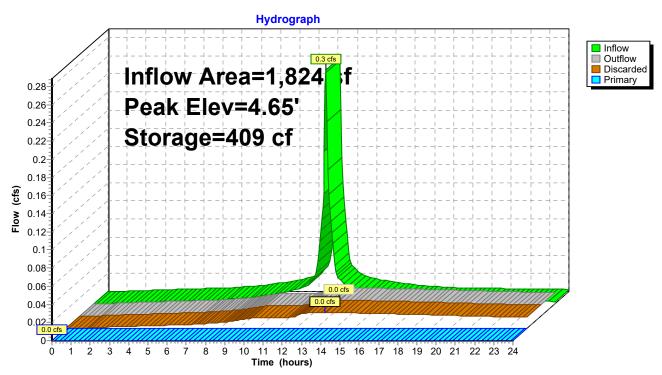
Discarded OutFlow Max=0.0 cfs @ 13.48 hrs HW=4.65' (Free Discharge)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=2.50' (Free Discharge)

2=Broad-Crested Rectangular Weir (Controls 0.0 cfs)

1=Exfiltration (Exfiltration Controls 0.0 cfs)

### **Pond 4P: DRIVE STONE**



#### **51 BURCH-POST**

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# Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points Runoff by SCS TR-20 method, UH=SCS, Weighted-CN Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DR: DRIVE Runoff Area=674 sf 100.00% Impervious Runoff Depth>3.80"

Tc=6.0 min CN=98 Runoff=0.1 cfs 214 cf

Subcatchment DR-2: DRIVE Runoff Area=674 sf 100.00% Impervious Runoff Depth>3.80"

Tc=6.0 min CN=98 Runoff=0.1 cfs 214 cf

Subcatchment PR: ROOF Runoff Area=1,150 sf 100.00% Impervious Runoff Depth>3.80"

Tc=6.0 min CN=98 Runoff=0.1 cfs 364 cf

Subcatchment PR-2: ROOF Runoff Area=1,150 sf 100.00% Impervious Runoff Depth>3.80"

Tc=6.0 min CN=98 Runoff=0.1 cfs 364 cf

**Subcatchment SC-100: Subcatchment 100**Runoff Area=2,445 sf 27.16% Impervious Runoff Depth>2.49"

Tc=6.0 min CN=85 Runoff=0.2 cfs 508 cf

Reach DP-1: Design Point 1

Reach DP-2: Design Point 2 Inflow=0.2 cfs 508 cf

Outflow=0.2 cfs 508 cf

Pond 2P: DRIVE STONE Peak Elev=3.65' Storage=218 cf Inflow=0.2 cfs 578 cf

Discarded=0.0 cfs 577 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 577 cf

Pond 4P: DRIVE STONE Peak Elev=3.65' Storage=218 cf Inflow=0.2 cfs 578 cf

Discarded=0.0 cfs 577 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 577 cf

Total Runoff Area = 6,093 sf Runoff Volume = 1,664 cf Average Runoff Depth = 3.28" 29.23% Pervious = 1,781 sf 70.77% Impervious = 4,312 sf

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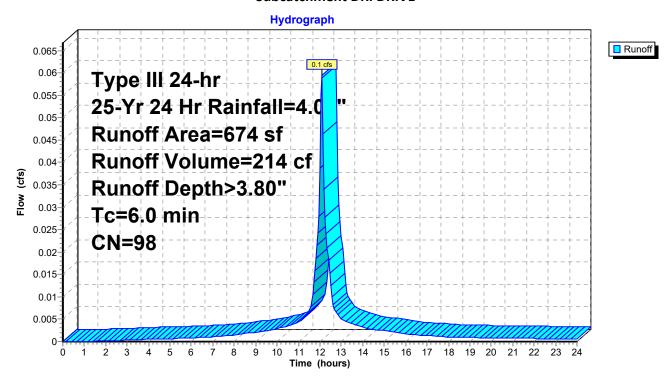
### **Summary for Subcatchment DR: DRIVE**

Runoff = 0.1 cfs @ 12.09 hrs, Volume= 214 cf, Depth> 3.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 25-Yr 24 Hr Rainfall=4.04"

	Α	rea (sf)	CN	Description							
		674	98 Paved parking, HSG D								
	674 100.00% Impervious Area										
(m	Tc	Length (feet)	Slope (ft/ft	Velocity (ft/sec)	Capacity (cfs)	Description					
	in) 5.0	(leet)	(11/11	(11/380)	(CIS)	Direct Entry, Min. Engineering Practice					

#### **Subcatchment DR: DRIVE**



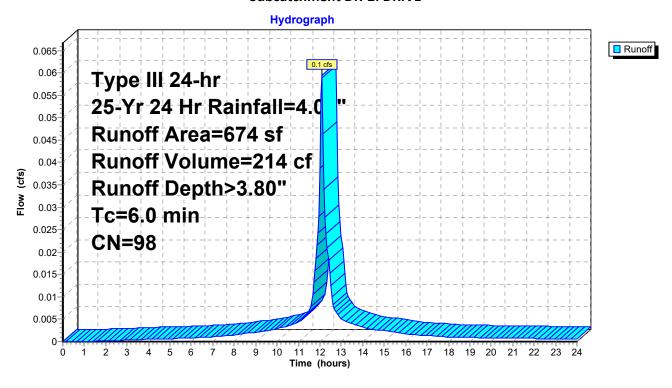
#### **Summary for Subcatchment DR-2: DRIVE**

Runoff = 0.1 cfs @ 12.09 hrs, Volume= 214 cf, Depth> 3.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 25-Yr 24 Hr Rainfall=4.04"

	Ar	ea (sf)	CN	Description								
		674	74 98 Paved parking, HSG D									
	674 100.00% Impervious Area											
T (min		Length (feet)	Slop (ft/f	e Velocity t) (ft/sec)	Capacity (cfs)	Description						
6.	0	•	•		•	Direct Entry, Min. Engineering Practice						

#### **Subcatchment DR-2: DRIVE**



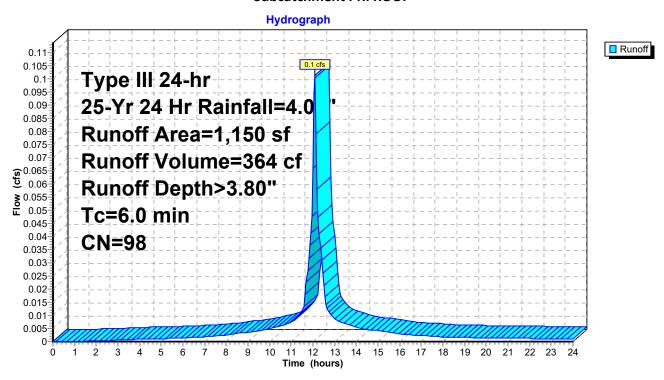
### **Summary for Subcatchment PR: ROOF**

Runoff = 0.1 cfs @ 12.09 hrs, Volume= 364 cf, Depth> 3.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 25-Yr 24 Hr Rainfall=4.04"

A	rea (sf)	CN [	Description								
	1,150	98 F	Roofs, HSG I	)							
	1,150		100.00% Impervious Area								
Tc	Length		Velocity		Description						
(min)	(feet)	(ft/ft	(ft/sec)	(cfs)							
6.0					Direct Entry,						

#### **Subcatchment PR: ROOF**



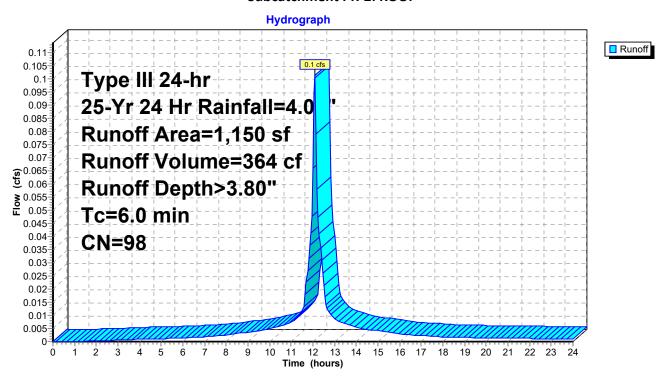
#### **Summary for Subcatchment PR-2: ROOF**

Runoff = 0.1 cfs @ 12.09 hrs, Volume= 364 cf, Depth> 3.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 25-Yr 24 Hr Rainfall=4.04"

A	rea (sf)	CN [	Description								
	1,150	98 F	Roofs, HSG I	)							
	1,150		100.00% Impervious Area								
Tc	Length		Velocity		Description						
(min)	(feet)	(ft/ft	(ft/sec)	(cfs)							
6.0					Direct Entry,						

#### **Subcatchment PR-2: ROOF**



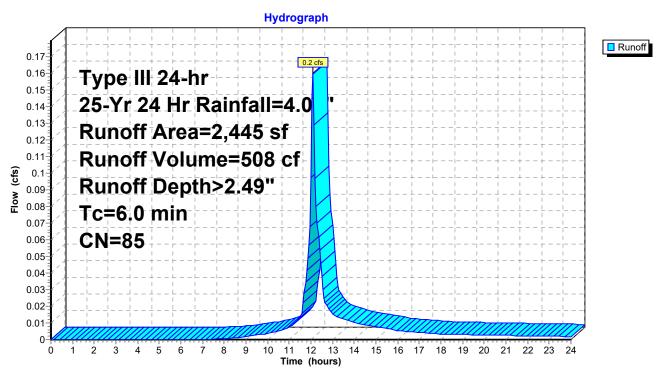
### Summary for Subcatchment SC-100: Subcatchment 100

Runoff = 0.2 cfs @ 12.09 hrs, Volume= 508 cf, Depth> 2.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 25-Yr 24 Hr Rainfall=4.04"

	Area (sf)	CN	Description	escription									
	1,266	80	>75% Grass	75% Grass cover, Good, HSG D									
	515	80	>75% Grass	75% Grass cover, Good, HSG D									
*	664	98	Pavers, HSG	avers, HSG D									
	2,445	85	Weighted A	verage									
	1,781		72.84% Pervious Area										
	664		27.16% Imp	ervious Are	ea								
	Tc Length	n Slo	e Velocity	Capacity	Description								
	0-		•		,								
(m	in) (feet	) (ft/	t) (ft/sec)	(cfs)									
6	5.0				Direct Entry, Min. Engineering Practice								

#### **Subcatchment SC-100: Subcatchment 100**



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Summary for Reach DP-1: Design Point 1

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### Summary for Reach DP-2: Design Point 2

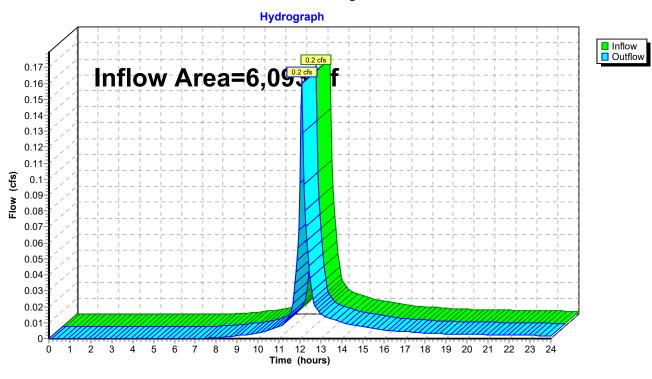
Inflow Area = 6,093 sf, 70.77% Impervious, Inflow Depth > 1.00" for 25-Yr 24 Hr event

Inflow = 0.2 cfs @ 12.09 hrs, Volume= 508 cf

Outflow = 0.2 cfs @ 12.09 hrs, Volume= 508 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

#### Reach DP-2: Design Point 2



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#### **Summary for Pond 2P: DRIVE STONE**

Inflow Area = 1,824 sf,100.00% Impervious, Inflow Depth > 3.80" for 25-Yr 24 Hr event

Inflow = 0.2 cfs @ 12.09 hrs, Volume= 578 cf

Outflow = 0.0 cfs @ 12.96 hrs, Volume= 577 cf, Atten= 91%, Lag= 52.6 min

Discarded = 0.0 cfs @ 12.96 hrs, Volume= 577 cf Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Peak Elev= 3.65' @ 12.96 hrs Surf.Area= 475 sf Storage= 218 cf

Plug-Flow detention time= 119.2 min calculated for 577 cf (100% of inflow)

Center-of-Mass det. time= 118.2 min (869.6 - 751.3)

Volume	Inve	ert Ava	il.Storage	Storage Descriptio	n					
#1	2.5	2.50' 646 cf		Custom Stage Data (Irregular) Listed below (Recalc) 1,615 cf Overall x 40.0% Voids						
Elevation (fee		Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)				
2.5	50	475	119.0	0	0	475				
5.9	90	475	119.0	1,615	1,615	880				
Device	Routing	Inv	ert Outle	et Devices						
#1	Discarded	d 2.	50' <b>1.02</b>	0 in/hr Exfiltration						
#2	Primary	5.		ong (Profile 1) Broad-Crested Rectangular Weir d (feet) 0.49 0.98 1.48						

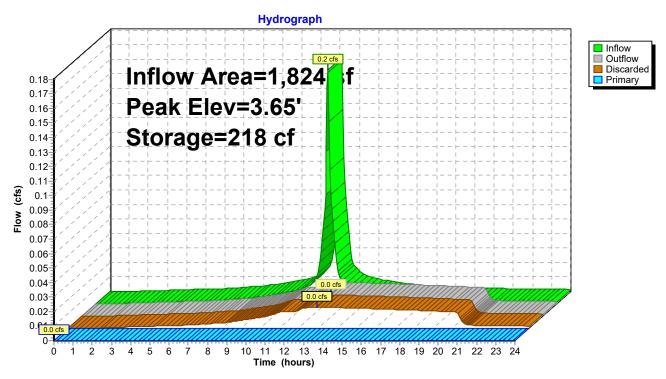
**Discarded OutFlow** Max=0.0 cfs @ 12.96 hrs HW=3.65' (Free Discharge) 1=Exfiltration (Exfiltration Controls 0.0 cfs)

Coef. (English) 2.92 3.37 3.59

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=2.50' (Free Discharge) 2=Broad-Crested Rectangular Weir (Controls 0.0 cfs)

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#### **Pond 2P: DRIVE STONE**



#### **51 BURCH-POST**

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#### **Summary for Pond 4P: DRIVE STONE**

Inflow Area = 1,824 sf,100.00% Impervious, Inflow Depth > 3.80" for 25-Yr 24 Hr event

Inflow = 0.2 cfs @ 12.09 hrs, Volume= 578 cf

Outflow = 0.0 cfs @ 12.96 hrs, Volume= 577 cf, Atten= 91%, Lag= 52.6 min

Discarded = 0.0 cfs @ 12.96 hrs, Volume= 577 cf Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Peak Elev= 3.65' @ 12.96 hrs Surf.Area= 475 sf Storage= 218 cf

Plug-Flow detention time= 119.2 min calculated for 577 cf (100% of inflow)

Center-of-Mass det. time= 118.2 min (869.6 - 751.3)

Volume	Inve	rt Avai	l.Storage	Storage Descriptio	n					
#1	2.50	.50' 646 cf		Custom Stage Data 1,615 cf Overall x		below (Recalc)				
Elevation (fee		Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)				
2.5 5.9		475 475	119.0 119.0	0 1,615	0 1,615	475 880				
Device	Routing	Inve	ert Outle	et Devices						
#1 #2	Discarded Primary	5.85' <b>8.0' l</b>		0 in/hr Exfiltration over Wetted area long (Profile 1) Broad-Crested Rectangular Weir d (feet) 0.49 0.98 1.48						

Discarded OutFlow Max=0.0 cfs @ 12.96 hrs HW=3.65' (Free Discharge)

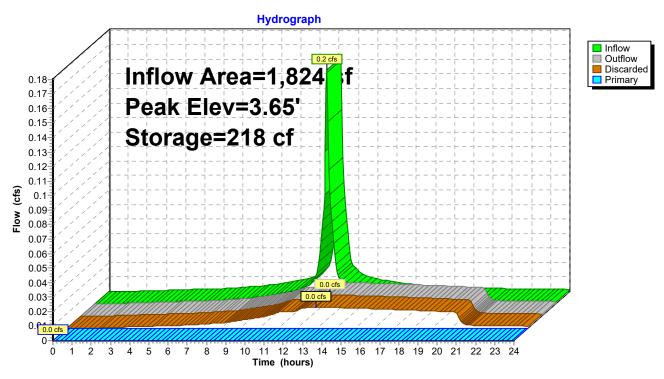
1=Exfiltration (Exfiltration Controls 0.0 cfs)

Coef. (English) 2.92 3.37 3.59

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=2.50' (Free Discharge) 2=Broad-Crested Rectangular Weir (Controls 0.0 cfs)

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#### **Pond 4P: DRIVE STONE**



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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DR: DRIVE Runoff Area=674 sf 100.00% Impervious Runoff Depth>11.25"

Tc=6.0 min CN=98 Runoff=0.2 cfs 632 cf

Subcatchment DR-2: DRIVE Runoff Area=674 sf 100.00% Impervious Runoff Depth>11.25"

Tc=6.0 min CN=98 Runoff=0.2 cfs 632 cf

Subcatchment PR: ROOF Runoff Area=1,150 sf 100.00% Impervious Runoff Depth>11.25"

Tc=6.0 min CN=98 Runoff=0.3 cfs 1,078 cf

Subcatchment PR-2: ROOF Runoff Area=1,150 sf 100.00% Impervious Runoff Depth>11.25"

Tc=6.0 min CN=98 Runoff=0.3 cfs 1,078 cf

**Subcatchment SC-100: Subcatchment 100**Runoff Area=2,445 sf 27.16% Impervious Runoff Depth>9.62"

Tc=6.0 min CN=85 Runoff=0.6 cfs 1,959 cf

Reach DP-1: Design Point 1

Reach DP-2: Design Point 2 Inflow=0.9 cfs 2,480 cf

Outflow=0.9 cfs 2,480 cf

Pond 2P: DRIVE STONE Peak Elev=5.91' Storage=646 cf Inflow=0.5 cfs 1,710 cf

Discarded=0.0 cfs 1,151 cf Primary=0.3 cfs 261 cf Outflow=0.3 cfs 1,412 cf

Pond 4P: DRIVE STONE Peak Elev=5.91' Storage=646 cf Inflow=0.5 cfs 1,710 cf

Discarded=0.0 cfs 1,151 cf Primary=0.3 cfs 261 cf Outflow=0.3 cfs 1,412 cf

Total Runoff Area = 6,093 sf Runoff Volume = 5,380 cf Average Runoff Depth = 10.60" 29.23% Pervious = 1,781 sf 70.77% Impervious = 4,312 sf

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#### **Summary for Subcatchment DR: DRIVE**

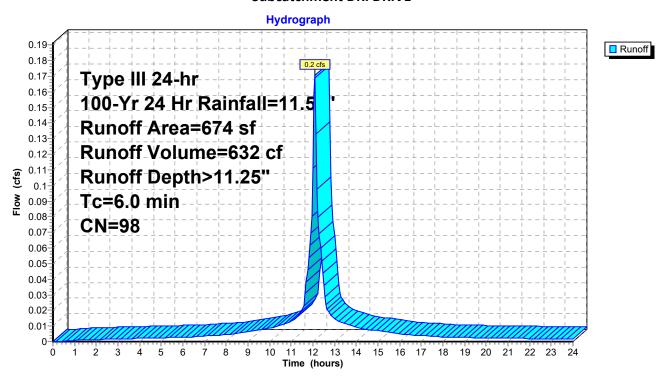
Runoff 0.2 cfs @ 12.09 hrs, Volume= 632 cf, Depth>11.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 100-Yr 24 Hr Rainfall=11.50"

А	rea (sf)	CN E	Description						
674 98 Paved parking, HSG D									
	674	1	.00.00% Imp	pervious Ar	ea				
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description				
6.0					Direct Entry, Min. Engineering Practice				

## **Direct Entry, Min. Engineering Practice**

#### **Subcatchment DR: DRIVE**



#### **Summary for Subcatchment DR-2: DRIVE**

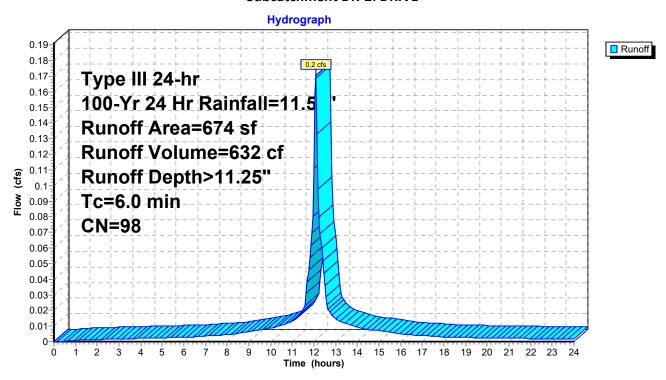
Runoff 0.2 cfs @ 12.09 hrs, Volume= 632 cf, Depth>11.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 100-Yr 24 Hr Rainfall=11.50"

_	Α	rea (sf)	CN D	Description								
		674	74 98 Paved parking, HSG D									
-	674 100.00% Impervious Area											
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description						
-	6.0		•			Direct Entry, Min. Engineering Practice						

# **Direct Entry, Min. Engineering Practice**

#### **Subcatchment DR-2: DRIVE**



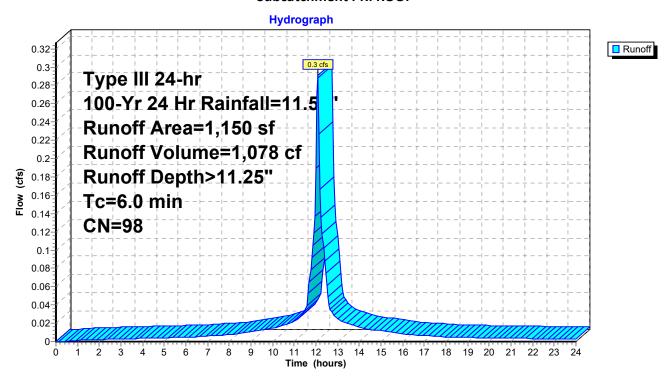
#### **Summary for Subcatchment PR: ROOF**

Runoff = 0.3 cfs @ 12.09 hrs, Volume= 1,078 cf, Depth>11.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 100-Yr 24 Hr Rainfall=11.50"

A	rea (sf)	CN [	Description								
	1,150	98 F	Roofs, HSG I	)							
	1,150		100.00% Impervious Area								
Tc	Length		Velocity		Description						
(min)	(feet)	(ft/ft	(ft/sec)	(cfs)							
6.0					Direct Entry,						

#### **Subcatchment PR: ROOF**



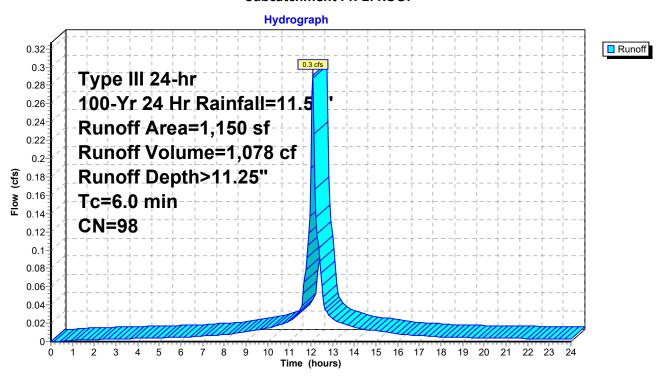
#### **Summary for Subcatchment PR-2: ROOF**

Runoff = 0.3 cfs @ 12.09 hrs, Volume= 1,078 cf, Depth>11.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 100-Yr 24 Hr Rainfall=11.50"

A	rea (sf)	CN	Description									
	1,150	98	Roofs, HSG [	oofs, HSG D								
•	1,150	100.00% Impervious Area										
Tc (min)	Length (feet)	Slope (ft/ft	•	Capacity (cfs)	Description							
6.0					Direct Entry,							

#### **Subcatchment PR-2: ROOF**



#### Summary for Subcatchment SC-100: Subcatchment 100

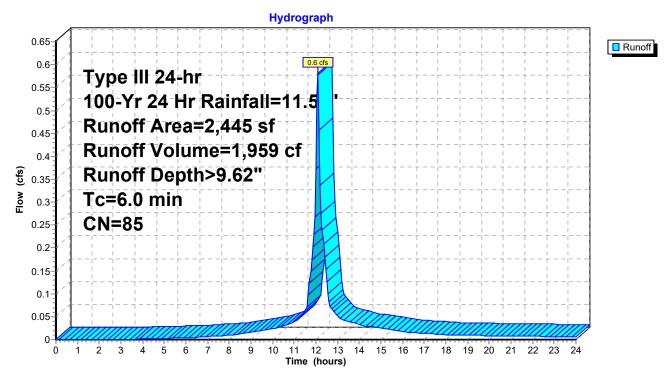
Runoff 0.6 cfs @ 12.09 hrs, Volume= 1,959 cf, Depth> 9.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr 100-Yr 24 Hr Rainfall=11.50"

	Ar	ea (sf)	CN	Description	Description								
		1,266	80	>75% Grass	75% Grass cover, Good, HSG D								
		515	80	>75% Grass	75% Grass cover, Good, HSG D								
*		664	98	Pavers, HSG	i D								
		2,445	85	Weighted A	verage								
		1,781		72.84% Per	72.84% Pervious Area								
		664		27.16% lmp	27.16% Impervious Area								
	Tc	Length	Slop	e Velocity	Capacity	Description							
(m	nin)	(feet)	(ft/f	,	. ,	,,,,,							
	6.0	•		•	•	Direct Entry,	Min. Engineering Practice						

**Direct Entry, Min. Engineering Practice** 

#### Subcatchment SC-100: Subcatchment 100



Summary for Reach DP-1: Design Point 1

#### Summary for Reach DP-2: Design Point 2

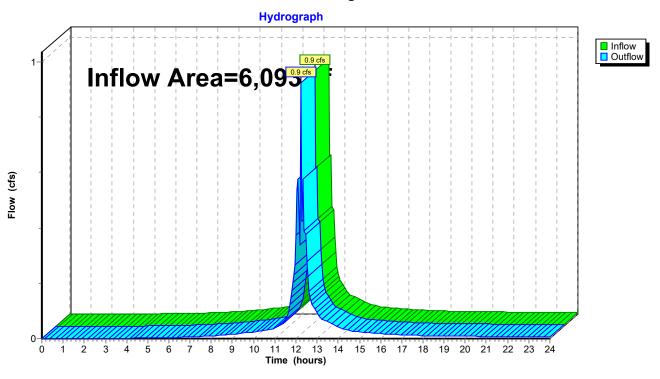
Inflow Area = 6,093 sf, 70.77% Impervious, Inflow Depth > 4.89" for 100-Yr 24 Hr event

Inflow = 0.9 cfs @ 12.25 hrs, Volume= 2,480 cf

Outflow = 0.9 cfs @ 12.25 hrs, Volume= 2,480 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

#### Reach DP-2: Design Point 2



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#### **Summary for Pond 2P: DRIVE STONE**

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Peak Elev= 5.91' @ 12.26 hrs Surf.Area= 475 sf Storage= 646 cf

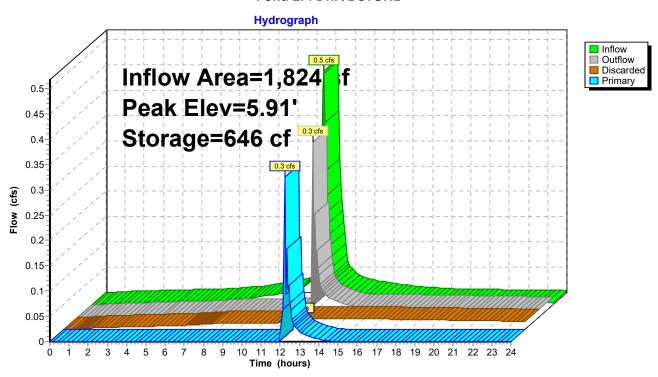
Plug-Flow detention time= 202.6 min calculated for 1,412 cf (83% of inflow) Center-of-Mass det. time= 130.3 min (867.1 - 736.8)

Volume	Inver	t Avai	il.Storage	Storage Description	on					
#1	2.50	, i	646 cf	, , , , , , , , , , , , , , , , , , ,						
				1,615 cf Overall >	( 40.0% Voids					
Elevation	on S	urf.Area	Perim.	Inc.Store	Cum.Store	Wet.Area				
(fee	et)	(sq-ft)	(feet)	(cubic-feet)	(cubic-feet)	(sq-ft)				
2.	50	475	119.0	0	0	475				
5.9	90	475	119.0	1,615	1,615	880				
Device Routing Invert Outlet			et Devices							
#1	#1 Discarded		50' <b>1.02</b> (	020 in/hr Exfiltration over Wetted area						
#2	Primary	5.	85' <b>8.0'</b> l	8.0' long (Profile 1) Broad-Crested Rectangular Weir						
Hea			Head	lead (feet) 0.49 0.98 1.48						

**Discarded OutFlow** Max=0.0 cfs @ 12.25 hrs HW=5.91' (Free Discharge) 1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.3 cfs @ 12.25 hrs HW=5.90' (Free Discharge) 2=Broad-Crested Rectangular Weir (Weir Controls 0.3 cfs @ 0.7 fps)

#### **Pond 2P: DRIVE STONE**



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#### **Summary for Pond 4P: DRIVE STONE**

1,824 sf,100.00% Impervious, Inflow Depth > 11.25" for 100-Yr 24 Hr event Inflow Area =

Inflow 0.5 cfs @ 12.09 hrs, Volume= 1,710 cf

0.3 cfs @ 12.25 hrs, Volume= 1,412 cf, Atten= 25%, Lag= 10.1 min Outflow =

Discarded = 0.0 cfs @ 12.25 hrs, Volume= 1,151 cf Primary = 0.3 cfs @ 12.25 hrs, Volume= 261 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Peak Elev= 5.91' @ 12.26 hrs Surf.Area= 475 sf Storage= 646 cf

Plug-Flow detention time= 202.6 min calculated for 1,412 cf (83% of inflow)

Center-of-Mass det. time= 130.3 min (867.1 - 736.8)

Volume	Inve	ert Ava	il.Storage	Storage Descriptio	n				
#1 2		50'	646 cf	Custom Stage Data (Irregular) Listed below (Recalc) 1.615 cf Overall x 40.0% Voids					
				1,013 ci 0 veruii x	40.070 Volus				
Elevation	on	Surf.Area	Perim.	Inc.Store	Cum.Store	Wet.Area			
(fee	et)	(sq-ft)	(feet)	(cubic-feet)	(cubic-feet)	(sq-ft)			
2.	50	475	119.0	0	0	475			
5.9	90	475	119.0	1,615	1,615	880			
Device	Routing	Inv	ert Outle	et Devices					
#1	#1 Discarded 2.50' <b>1.02</b>		.50' <b>1.02</b> (	0 in/hr Exfiltration over Wetted area					
#2	Primary	5.	.85' <b>8.0' l</b>	ong (Profile 1) Broa	ad-Crested Rectang	gular Weir			
			Head	l (feet) 0.49 0.98 1	1 48				

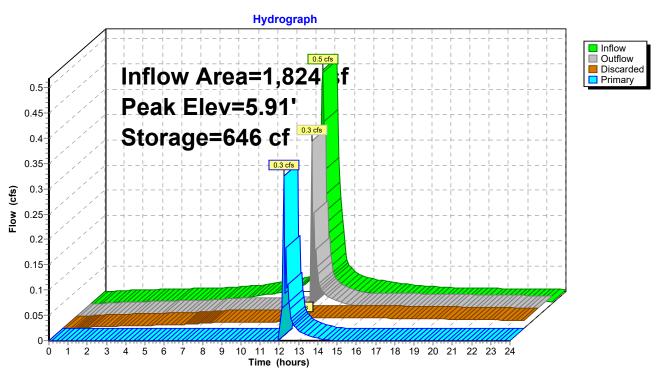
Head (feet) 0.49 0.98 1.48 Coef. (English) 2.92 3.37 3.59

Discarded OutFlow Max=0.0 cfs @ 12.25 hrs HW=5.91' (Free Discharge)

1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.3 cfs @ 12.25 hrs HW=5.90' (Free Discharge) **T\_2=Broad-Crested Rectangular Weir** (Weir Controls 0.3 cfs @ 0.7 fps)

#### **Pond 4P: DRIVE STONE**



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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DR: DRIVE Runoff Area=674 sf 100.00% Impervious Runoff Depth>7.40"

Tc=6.0 min CN=98 Runoff=0.1 cfs 415 cf

Subcatchment DR-2: DRIVE Runoff Area=674 sf 100.00% Impervious Runoff Depth>7.40"

Tc=6.0 min CN=98 Runoff=0.1 cfs 415 cf

Subcatchment PR: ROOF Runoff Area=1,150 sf 100.00% Impervious Runoff Depth>7.40"

Tc=6.0 min CN=98 Runoff=0.2 cfs 709 cf

Subcatchment PR-2: ROOF Runoff Area=1,150 sf 100.00% Impervious Runoff Depth>7.40"

Tc=6.0 min CN=98 Runoff=0.2 cfs 709 cf

Subcatchment SC-100: Subcatchment 100 Runoff Area=2,445 sf 27.16% Impervious Runoff Depth>5.86"

Tc=6.0 min CN=85 Runoff=0.4 cfs 1,194 cf

Reach DP-1: Design Point 1

Reach DP-2: Design Point 2 Inflow=0.4 cfs 1,194 cf

Outflow=0.4 cfs 1,194 cf

Pond 2P: DRIVE STONE Peak Elev=5.22' Storage=516 cf Inflow=0.3 cfs 1,124 cf

Discarded=0.0 cfs 976 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 976 cf

Pond 4P: DRIVE STONE Peak Elev=5.22' Storage=516 cf Inflow=0.3 cfs 1,124 cf

Discarded=0.0 cfs 976 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 976 cf

Total Runoff Area = 6,093 sf Runoff Volume = 3,443 cf Average Runoff Depth = 6.78" 29.23% Pervious = 1,781 sf 70.77% Impervious = 4,312 sf

#### **Summary for Subcatchment DR: DRIVE**

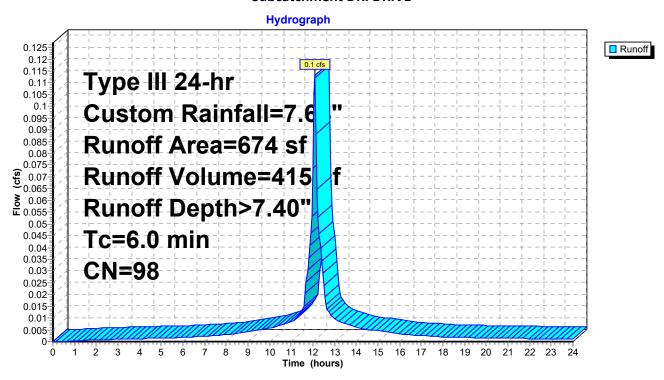
415 cf, Depth> 7.40" Runoff 0.1 cfs @ 12.09 hrs, Volume=

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr Custom Rainfall=7.64"

_	Α	rea (sf)	CN	Description								
		674	98	Paved parking, HSG D								
		674 100.00% Impervious Area										
_	Tc (min)	Length (feet)	Slope (ft/ft	e Velocity ) (ft/sec)	Capacity (cfs)	Description						
	6.0	•	•		•	Direct Entry, Min. Engineering Practice						

**Direct Entry, Min. Engineering Practice** 

#### **Subcatchment DR: DRIVE**



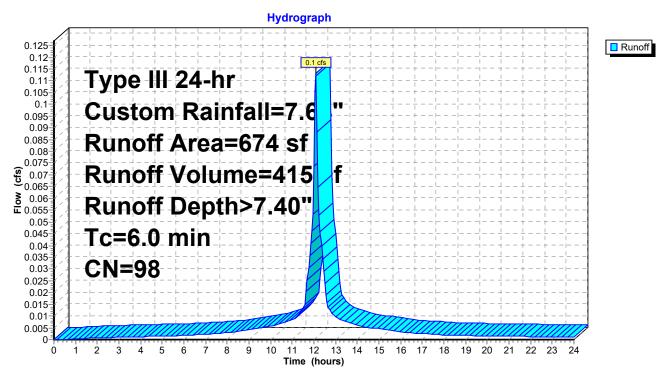
#### **Summary for Subcatchment DR-2: DRIVE**

Runoff = 0.1 cfs @ 12.09 hrs, Volume= 415 cf, Depth> 7.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr Custom Rainfall=7.64"

	Are	ea (sf)	CN	Description								
		674	98	Paved parking, HSG D								
		674 100.00% Impervious Area										
T (min		ength	Slop (ft/f	e Velocity ) (ft/sec)	Capacity (cfs)	Description						
6.	0		•		•	Direct Entry, Min. Engineering Practice						

#### **Subcatchment DR-2: DRIVE**



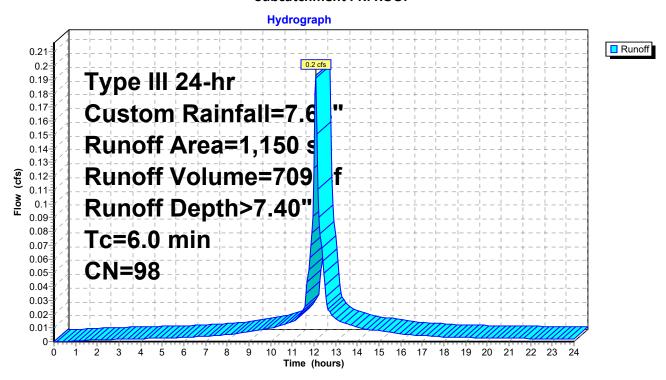
#### **Summary for Subcatchment PR: ROOF**

Runoff = 0.2 cfs @ 12.09 hrs, Volume= 709 cf, Depth> 7.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr Custom Rainfall=7.64"

_	А	rea (sf)	CN	Description								
		1,150	98	Roofs, HSG D								
		1,150		100.00% Impervious Area								
	Tc	Length	Slope	· Velocity	Capacity	Description						
	(min)	(feet)	(ft/ft	(ft/sec)	(cfs)							
	6.0					Direct Entry,						

#### **Subcatchment PR: ROOF**



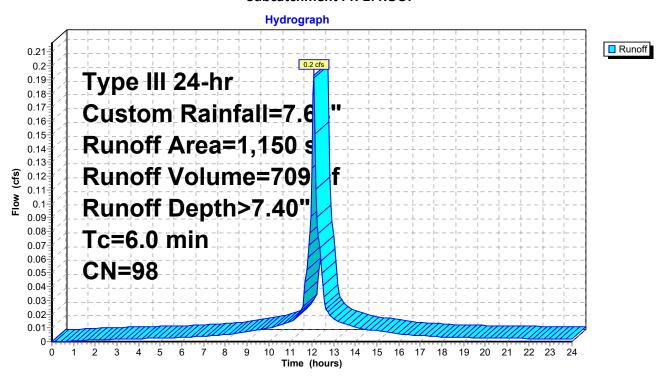
#### **Summary for Subcatchment PR-2: ROOF**

Runoff = 0.2 cfs @ 12.09 hrs, Volume= 709 cf, Depth> 7.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr Custom Rainfall=7.64"

_	А	rea (sf)	CN	Description								
		1,150	98	Roofs, HSG D								
		1,150	,150 100.00% Impervious Area									
	Tc	Length	Slop	e Velocity	Capacity	Description						
	(min)	(feet)	(ft/f	(ft/sec)	(cfs)							
_	6.0					Direct Entry,						

#### **Subcatchment PR-2: ROOF**



### Summary for Subcatchment SC-100: Subcatchment 100

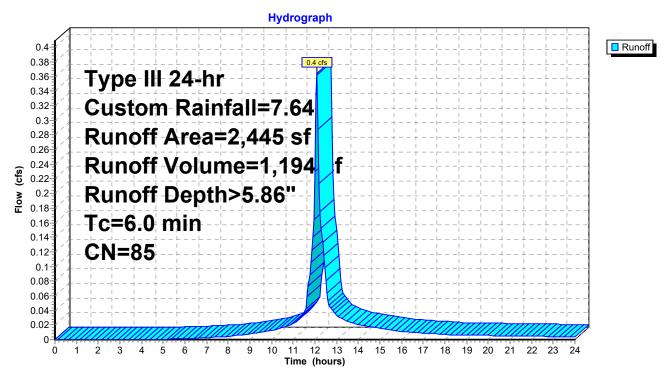
0.4 cfs @ 12.09 hrs, Volume= 1,194 cf, Depth> 5.86" Runoff

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type III 24-hr Custom Rainfall=7.64"

	Α	rea (sf)	CN	Description	Description								
		1,266	80	>75% Grass									
		515	80	>75% Grass cover, Good, HSG D									
*		664	98	Pavers, HSG D									
		2,445	85	Weighted Average									
		1,781		72.84% Pervious Area									
		664		27.16% lmp	27.16% Impervious Area								
	Tc	Length	Slop	e Velocity	Capacity	Description							
_	(min)	(feet)	(ft/f	t) (ft/sec) (cfs)									
	6.0					Direct Entry,	Min. Engineering Practice						

**Direct Entry, Min. Engineering Practice** 

#### Subcatchment SC-100: Subcatchment 100



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Summary for Reach DP-1: Design Point 1

### Summary for Reach DP-2: Design Point 2

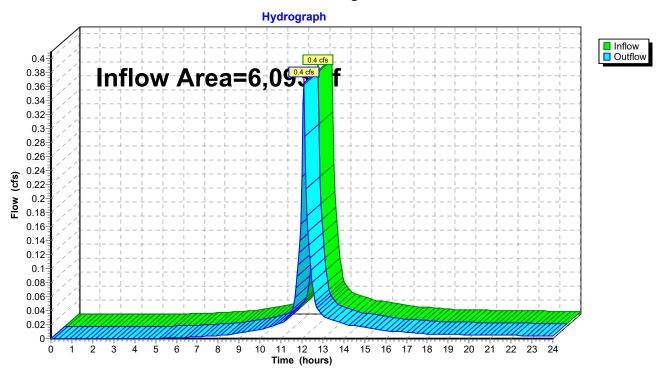
Inflow Area = 6,093 sf, 70.77% Impervious, Inflow Depth > 2.35" for Custom event

Inflow = 0.4 cfs @ 12.09 hrs, Volume= 1,194 cf

Outflow = 0.4 cfs @ 12.09 hrs, Volume= 1,194 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

#### Reach DP-2: Design Point 2



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#### **Summary for Pond 2P: DRIVE STONE**

Inflow Area = 1,824 sf,100.00% Impervious, Inflow Depth > 7.40" for Custom event
Inflow = 0.3 cfs @ 12.09 hrs, Volume= 1,124 cf
Outflow = 0.0 cfs @ 13.70 hrs, Volume= 976 cf, Atten= 94%, Lag= 96.7 min
Discarded = 0.0 cfs @ 13.70 hrs, Volume= 976 cf
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Peak Elev= 5.22' @ 13.70 hrs Surf.Area= 475 sf Storage= 516 cf

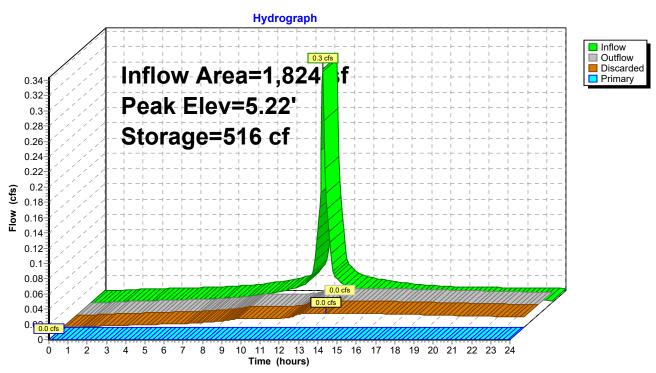
Plug-Flow detention time= 234.7 min calculated for 976 cf (87% of inflow) Center-of-Mass det. time= 174.3 min (915.6 - 741.4)

Volume	Inve	rt Ava	il.Storage	e Storage Description							
#1	2.50	<b>)</b> '	646 cf								
				1,615 cf Overall	x 40.0% Voids						
Elevati	on S	Surf.Area	Perim.	Inc.Store	Cum.Store	Wet.Area					
(fee	et)	(sq-ft)	(feet)	(cubic-feet)	(cubic-feet)	(sq-ft)					
2.	50	475	119.0	0	0	475					
5.	90	475	119.0	1,615	1,615	880					
Dovice	Pouting	Inv	ort Outl	et Devices							
Device	Routing										
#1	Discarded	2		1.020 in/hr Exfiltration over Wetted area							
#2	Primary	5	.85' <b>8.0'</b>	long (Profile 1) Bro	oad-Crested Rectan	gular Weir					
			Hea	lead (feet) 0.49 0.98 1.48							

**Discarded OutFlow** Max=0.0 cfs @ 13.70 hrs HW=5.21' (Free Discharge) 1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=2.50' (Free Discharge) 2=Broad-Crested Rectangular Weir (Controls 0.0 cfs)

#### **Pond 2P: DRIVE STONE**



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#### **Summary for Pond 4P: DRIVE STONE**

Inflow Area = 1,824 sf,100.00% Impervious, Inflow Depth > 7.40" for Custom event
Inflow = 0.3 cfs @ 12.09 hrs, Volume= 1,124 cf
Outflow = 0.0 cfs @ 13.70 hrs, Volume= 976 cf, Atten= 94%, Lag= 96.7 min
Discarded = 0.0 cfs @ 13.70 hrs, Volume= 976 cf
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Peak Elev= 5.22' @ 13.70 hrs Surf.Area= 475 sf Storage= 516 cf

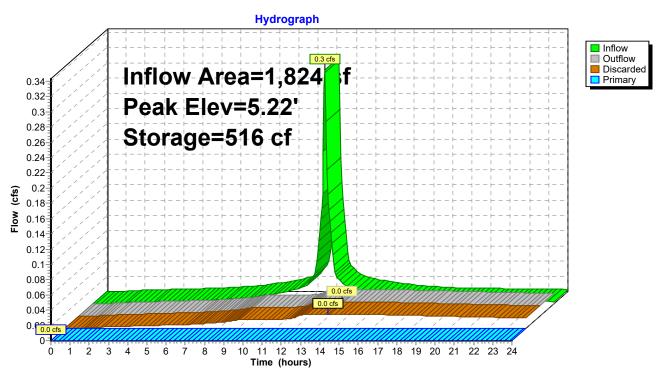
Plug-Flow detention time= 234.7 min calculated for 976 cf (87% of inflow) Center-of-Mass det. time= 174.3 min (915.6 - 741.4)

Volume	Inver	t Avai	I.Storage	Storage Description	on					
#1 2.50'			646 cf	Custom Stage Date 1,615 cf Overall x	ta (Irregular) Listed 40.0% Voids	below (Recalc)				
Elevation (fee		urf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)				
2.	50	475	119.0	0	0	475				
5.	90	475	119.0	1,615	1,615	880				
Device	Device Routing Invert Ou			et Devices						
#1	1 Discarded 2.50'		50' <b>1.02</b> (	1.020 in/hr Exfiltration over Wetted area						
#2	Primary	5.	85' <b>8.0' l</b>	8.0' long (Profile 1) Broad-Crested Rectangular Weir						
			Head	d (feet) 0.49 0.98	1.48					
			Coef	. (English) 2.92 3.3	37 3.59					

**Discarded OutFlow** Max=0.0 cfs @ 13.70 hrs HW=5.21' (Free Discharge) 1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=2.50' (Free Discharge) 2=Broad-Crested Rectangular Weir (Controls 0.0 cfs)

#### **Pond 4P: DRIVE STONE**



# OPERATION AND MAINTENANCE & EROSION CONTROL PROGRAM

**FOR** 

## 51 BURCH STREET ARLINGTON, MASSACHUSETTS

PREPARED FOR:
SA DEVELOPMENT
200F Main Street Box 352
Stoneham, MA 02180

## PREPARED BY:

PATRIOT Engineering, LLC
PO BOX 362
Lexington, Massachusetts 02420
(978)726-2654

DATE: December 27, 2023 Revised February 20, 2024



Project Name: 51 Burch Street

Arlington, MA

**Applicants:** SA Development

200F Main Street Box 352

Stoneham MA 02180

**Party Responsible for Maintenance** 

**During Construction:** Contractor

**Party Responsible for Maintenance** 

After Construction: Property Owner

## **Erosion and Sedimentation Control Measures during Construction Activities**

#### **Filtermitt**

Filtermitt will be installed along the down gradient limit of work as depicted on the Site Construction Plan. The Filtermitt will be installed prior to the commencement of any work on-site. An additional supply of Filtermitt shall be on-site to replace and/or repair Filtermitt that is disturbed. The lines of Filtermitt shall be inspected and maintained on a weekly basis during construction. No construction activities are to occur beyond the Filtermitt at any time. Sediment shall be removed once the volume reaches ½ to ½ the height of the Filtermitt.

#### **Surface Stabilization**

The surface of all disturbed areas shall be stabilized during and after construction. Disturbed areas remaining idle for more than 14 days shall be stabilized. Temporary measures shall be taken during construction to prevent erosion and siltation. No construction sediment shall be allowed to enter any infiltration system or formal drainage system. All disturbed slopes will be stabilized with a permanent vegetative cover. Some or all of the following measures will be utilized on this project as conditions may warrant.

- a. Temporary Seeding
- b. Temporary Mulching
- c. Permanent Seeding
- d. Placement of Sod
- e. Hydroseeding
- f. Placement of Hay
- g. Placement of Jute Netting Dust shall be controlled at the site.

## **Tree Protection**

Existing trees to be saved shall be protected with orange construction fence (offset from the tree trunk by professional standard based on canopy).

### **Subsurface Infiltration Facilities**

Construction activity above and around the proposed location of the subsurface infiltration facility shall be limited to prevent compaction of the existing soil. Care shall be taken to redirect stormwater runoff from this area to prevent ponding. Installation of this system shall occur under dry weather conditions and system shall be backfilled immediately to prohibit the introduction of fines or other material that would compromise the functionality of this system.

## Silt Sacks

Silt Sacks shall be installed within the basins. The performance of the basins shall be checked after every major storm event during construction, in the event of clogging within the Silt Sack, it shall be removed and replaced with a clean Silt Sack. Stormwater quality unit shall be checked bi-weekly.

#### Removal of Sediment and Erosion Controls

At the completion of construction activities and after receiving approval from the Town of Arlington, all physical sediment and erosion controls shall be removed from the site.

## Long-Term Inspection and Maintenance Measures after Construction

Note: Inspection reports shall be maintained and provided to the Town of Arlington Engineering Division periodically or at the Division's request.

### **Erosion Control**

Eroded sediments can adversely affect the performance of the stormwater management system. Eroding or barren areas should be immediately re-vegetated.

## Pervious Paver / Infiltration Facility

The infiltration system inspections should include inspections following the first several rainfall events or first few months after construction, after all major storms (3.2" inches of rain over a 24-hour period or greater), and on regular bi-annual scheduled dates, to ascertain whether captured runoff drains within 72 hours following the event. Ponded water above the system after several dry days often indicates that the bottom of the system is clogged. If the water does not drain, then a qualified professional should be retained to determine the cause of apparent infiltration failure and recommend corrective action. Such corrective action should be immediately implemented by the homeowner.

### **Debris and Litter Removal**

Trash may collect in the BMP's, potentially causing clogging of the facilities. All debris and litter shall be removed when necessary, and after each storm event. Sediment and debris collected from vacuuming and/or sweeping should be disposed of at a permitted waste disposal facility. Avoid disposing of this material on site, where it could be washed into the proposed subsurface infiltration systems.

## STORMWATER MANAGEMENT CONSTRUCTION PHASE

## INSPECTION SCHEDULE AND EVALUATION CHECKLIST

PROJECT LOCATION: 51 Burch Street	WEATHER:
-----------------------------------	----------

Inspection Date	Inspector	Area Inspected	Required Inspection Frequency if BMP	Comments	Recommendation	Follow-up Inspection Required (yes/no)
		Filtermitt	Weekly and After Major Storm Events			
		Pervious Paver	Weekly and After Major Storm Events			
		Siltsack	Weekly and After Major Storm Events			

(1)	Refer to the Massachusetts Stormwater Handbook, Volume Two: Stormwater Technical Handbook (February 2008) for
	recommendations regarding frequency for inspection and maintenance of specific BMP's.

(2) Inspections to be conducted by a qualified professional such as an environmental scientist or civil engineer.

Limited or no use of sodium chloride salts, fertilizers or pesticides recommended.
Other notes: (Include deviations from: Con. Comm. Order of Conditions, PB Approval, Construction Sequence and Approved Plan)
Stormwater Control Manager:

## STORMWATER MANAGEMENT AFTER CONSTRUCTION

## INSPECTION SCHEDULE AND EVALUATION CHECKLIST

<b>PROJECT LOCATION: 51</b>	Burch Street	WEATHER:

Inspection Date	Inspector	Area Inspected	Required Inspection Frequency if BMP	Comments	Recommendation	Follow-up Inspection Required (yes/no)
		Pervious Paver	Bi-annually and After Major Storm Events			

<sup>(3)</sup> Refer to the Massachusetts Stormwater Handbook, Volume Two: Stormwater Technical Handbook (February 2008) for recommendations regarding frequency for inspection and maintenance of specific BMP's.

(4) Inspections to be conducted by a qualified professional such as an environmental scientist or civil engineer.

imited or no use of sodium chloride salts, fertilizers or pesticides recommended.
Other notes: (Include deviations from: Con. Comm. Order of Conditions, PB Approval, Construction Sequence and Approved Plan
tormwater Control Manager:

## Middlesex County, Massachusetts

## 655—Udorthents, wet substratum

## **Map Unit Setting**

National map unit symbol: vr1n Elevation: 0 to 3,000 feet

Mean annual precipitation: 32 to 54 inches Mean annual air temperature: 43 to 54 degrees F

Frost-free period: 110 to 240 days

Farmland classification: Not prime farmland

#### **Map Unit Composition**

Udorthents, wet substratum, and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of

the mapunit.

## **Description of Udorthents, Wet Substratum**

#### Setting

Parent material: Loamy alluvium and/or sandy glaciofluvial deposits and/or loamy glaciolacustrine deposits and/or loamy marine deposits and/or loamy basal till and/or loamy lodgment till

#### Properties and qualities

Slope: 0 to 8 percent

Depth to restrictive feature: More than 80 inches Depth to water table: More than 80 inches

Frequency of flooding: None Frequency of ponding: None

#### **Minor Components**

#### **Urban land**

Percent of map unit: 8 percent

Landform position (two-dimensional): Footslope Landform position (three-dimensional): Base slope

Down-slope shape: Linear Across-slope shape: Linear

#### Freetown

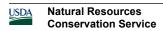
Percent of map unit: 4 percent Landform: Depressions, bogs

Landform position (two-dimensional): Toeslope Landform position (three-dimensional): Dip

Down-slope shape: Concave Across-slope shape: Concave Hydric soil rating: Yes

#### Swansea

Percent of map unit: 3 percent Landform: Depressions, bogs

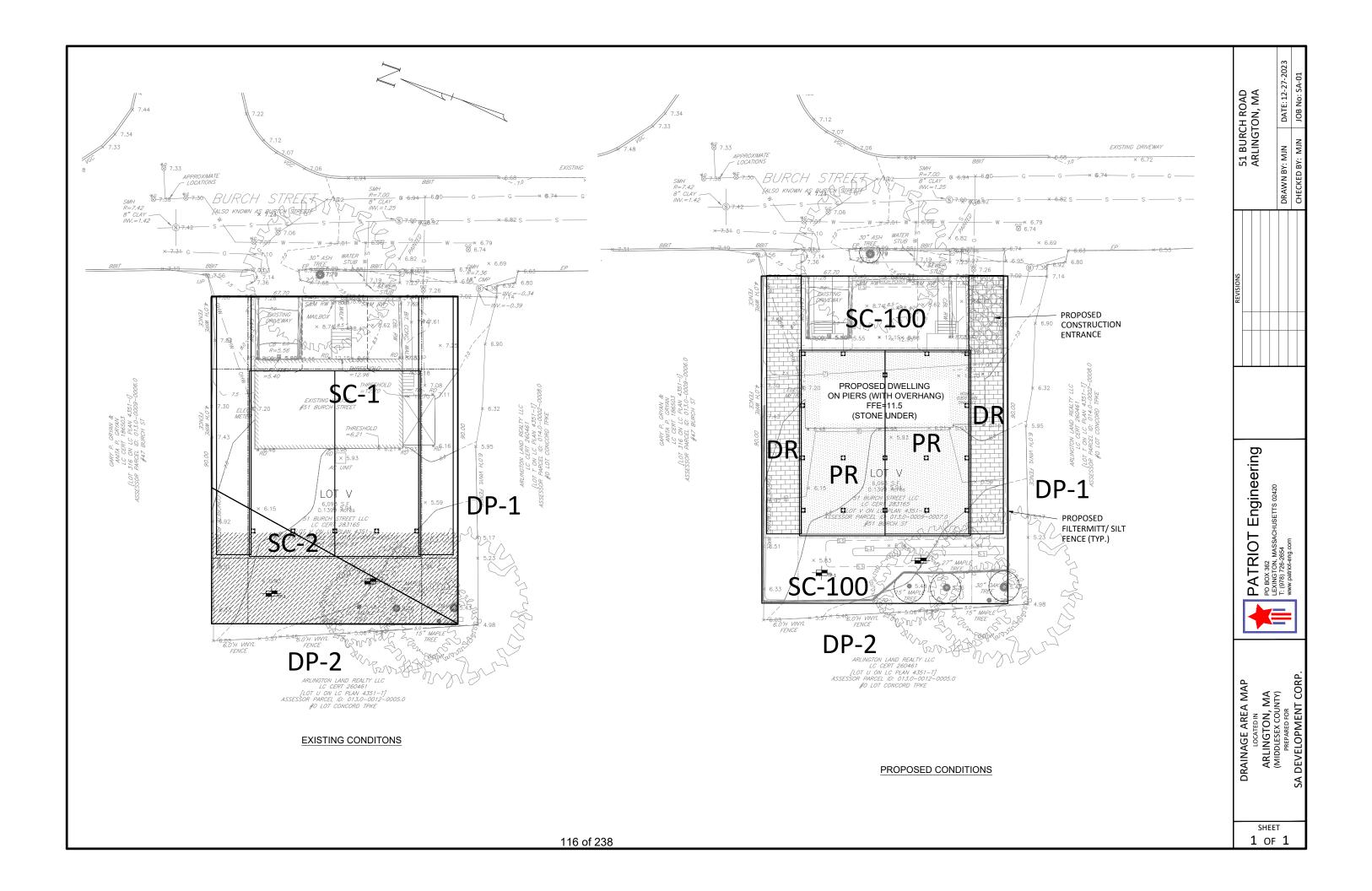


Landform position (two-dimensional): Toeslope Landform position (three-dimensional): Dip Down-slope shape: Concave Across-slope shape: Concave Hydric soil rating: Yes

## **Data Source Information**

Soil Survey Area: Middlesex County, Massachusetts

Survey Area Data: Version 23, Sep 12, 2023





## **Town of Arlington, Massachusetts**

DEP #091-0360: 2 Reservoir Road.

## Summary:

DEP #091-0360: 2 Reservoir Road.

This public hearing will consider a Notice of Intent to construct an addition off the rear of a single-family dwelling, renovate a front porch, and conduct landscaping and hardscaping activities within Riverfront Area and Bordering Land Subject to Flooding associated with Mill Brook, and within the 100-foot Buffer Zone to Bordering Vegetated Wetlands.

### **ATTACHMENTS:**

	Type	File Name	Description
ם	Reference Material	NOI_Application2_Reservoir_Road.pdf	NOI Application - 2 Reservoir Road.pdf



# Notice of Intent Application and Wetland Resource Area Analysis



February 21, 2024

## **Subject Property**

2 Reservoir Road Parcel ID: 60-2-5 Arlington, Massachusetts

## Applicants and Property Owners

Linnea and David Berggren
P. O. Box 750112
Arlington Heights, MA 02475

### LEC Environmental Consultants, Inc.

380 Lowell Street Suite 101 Wakefield, MA 01880 781-245-2500

www.lecenvironmental.com

118 of 238

PLYMOUTH, MA WAKEFIELD, MA WORCESTER, MA RINDGE, NH EAST PROVIDENCE, RI



[LEC File #: BerL23-557.02]

February 21, 2024

## **Hand Delivery**

Arlington Conservation Commission Arlington Town Hall Annex 730 Massachusetts Avenue Arlington, MA 02476

Re: **Notice of Intent Application and** 

Wetland Resource Area Analysis

2 Reservoir Road

Parcel ID: 60-2-5

Arlington, Massachusetts

Dear Members of the Conservation Commission:

On behalf of the Applicants and Property Owners, Linnea and David Berggren, LEC Environmental Consultants, Inc., (LEC) is filing the enclosed Notice of Intent (NOI) Application and Wetland Resource Area Analysis with the Arlington Conservation Commission to construct an addition, renovate a front porch, and conduct hardscaping and landscaping activities at 2 Reservoir Road in Arlington, Massachusetts. The proposed activities are located within Riverfront Area and Bordering Land Subject to Flooding associated with Mill Brook, and within the 100-foot Buffer Zone to Bordering Vegetated Wetlands. The Applicants propose to implement erosion controls to minimize the potential for impacts to the resource areas during construction, and provide stormwater management and implement a native restoration planting plan to improve existing site conditions and promote climate resiliency.

LEC was retained to identify Wetland Resource Areas protectable under the Massachusetts Wetlands Protection Act (M.G.L. c. 131, s. 40, the Act), its implementing Regulations (310 CMR 10.00, the Act Regulations), the Town of Arlington Wetlands Protection Bylaw (Article 8, the Bylaw), and its implementing Wetlands Protection Regulations (March 16, 2024, the Bylaw Regulations), and to prepare this NOI Application. The proposed conditions are depicted on the Conservation Plan, dated January 4, 2024, and prepared by Rober Survey PLS (Appendix B). Details of the landscape and restoration planting effort can be found on the Planting Plan, dated January 20, 2024 and revised February 20, 2024, and prepared by Holly Garden Design (Appendix C).

LEC Environmental Consultants, Inc.

12 Resnik Road Suite 1 Plymouth, MA 02360 508.746.9491

380 Lowell Street Suite 101 Wakefield, MA 01880 781.245.2500

100 Grove Street Suite 302 Worcester, MA 01605 508.753.3077

P.O. Box 590 Rindge, NH 03461

603.899.6726

680 Warren Avenue Suite 3 East Providence, RI 02914 401.685.3109 119 of 238 401.685.3109

www.lecenvironmental.com



Enclosed please find two checks made payable to the Town of Arlington in the amounts of Ninety-Five Dollars (\$95.00) and Two Hundred Dollars (\$200.00) for the purpose of filing this Application under State and Local guidelines, respectively. Payment to the Commonwealth of Massachusetts in the amount of Seventy Dollars (\$70.00) has been processed via eDEP.

Thank you for your consideration of this Application. We look forward to meeting with you at the March 7, 2024, Public Hearing. Should you have any questions, please do not hesitate to contact me in our Wakefield office at 781-245-2500 or at rkirby@lecenvironmental.com.

Sincerely,

LEC Environmental Consultants, Inc.

Richard A. Kirby

Senior Wetland Scientist

Nicole M. Ferrara

Mide M Jarran

Wetland Specialist

DEP, Northeast Region cc:

Scott Lynch

Holly Garden Design Linnea and David Berggren

David Mullen

rak: projects\23-557.02\NOIReport.doc



i.	WPA Form 3 – Notice of Intent	
ii.	WPA Appendix B – Wetland Fee Transmittal Form	
iii.	Local Filing Fee Form	
iv.	Legal Notice Charge Authorization	
v.	Affidavit of Service	
vi.	Letter to Abutters	
vii.	Abutter Notification Form	
viii.	Certified List of Abutters	
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3.1.3	Measurement of Vegetative Distribution and Density	4
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## Appendix A

Locus Maps

Figure 1: USGS Topographic Quadrangle

Figure 2: FEMA Flood Insurance Rate Map

Figure 3: MassGIS Orthophoto & NHESP Estimated Habitat Map

## **Appendix B**

Conservation Plan, dated January 4, 2024, prepared by Rover Survey

## **Appendix C**

*Planting Plan*, dated January 20, 2024 and revised February 20, 2024, prepared by Holly Garden Design

PLYMOUTH, MA WAKEFIELD, MA WORCESTER, MA RINDGE, NH EAST PROVIDENCE, RI



## WPA Form 3 - Notice of Intent

A. General Information

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40 Town of Arlington Wetlands Protection Bylaw (Article 8)

Provided by MassDEP:
•
MassDEP File Number
mace 2 in the manual
December 1 Towns of Control of
Document Transaction Number
Arlington
Arlington
City/Town
Only, roun

#### Important:

When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.





Note: Before completing this form consult your local Conservation Commission regarding any municipal bylaw or ordinance.

1.	<b>Project Location</b>	(Note: ele	ctronic filers	will click	on button	to locate	project	site):

2 Reservoir Road		Arlington	02474
a. Street Address		b. City/Town	c. Zip Code
ا مدند، مام مسما ا مسمن	4 al a .	42.42554	-71.18481
Latitude and Longi	tuae:	d. Latitude	e. Longitude
60-2		5	
f. Assessors Map/Plat N	Number	g. Parcel /Lot Numbe	r
2. Applicant:			
Linnea and David		Berggren	
a. First Name		b. Last Name	
Homeowners			
c. Organization			
P. O. Box 750112			
d. Street Address			20.47
Arlington Heights		MA	02474
e. City/Town	N1/A	f. State	g. Zip Code
781-475-7099 h. Phone Number	N/A	lberggit@gmail.com	
n. Phone Number	i. Fax Number	j. Email Address	
c. Organization			
d. Street Address			
e. City/Town		f. State	g. Zip Code
h. Phone Number	i. Fax Number	j. Email address	
Representative (if	any):		
Richard		Kirby	
a. First Name		b. Last Name	
LEC Environmenta	l Consultants, inc.		
c. Company			
380 Lowell Street,	Suite 101		
d. Street Address			
Wakefield		MA	01880
e. City/Town		f. State	g. Zip Code
781-245-2500	781-245-6677	rkirby@lecenvironme	ntal.com
h. Phone Number	i. Fax Number	j. Email address	
5. Total WPA Fee Pa	id (from NOI Wetland Fe	ee Transmittal Form):	
<b>#405.00</b>			
\$165.00	\$70.	00	\$95.00



## WPA Form 3 - Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40 Town of Arlington Wetlands Protection Bylaw (Article 8)

rov	rided by MassDEP:
	MassDEP File Number
	Document Transaction Number
	Arlington
	City/Town

## A. General Information (continued)

6.	General	Proie	ect De	escri	otion
О.	General	LIOIE	さしし レモ	25011	วแบ

The Applicants propose to construct an addition off the rear of an existing dwelling, renovate a front porch, and

construct additional hardscaping features located within the 100-foot Buffer Zone to BVW, Bordering L Subject to Flooding, and the outer 200-foot Riverfront Area associated with Mill Brook. Erosion Control stormwater management, and Riverfront Area restoration are proposed to mitigate for the proposed pro-			
7a.	Project Type Checklist: (Limited Project Types see	Section A. 7b.)	
	1. Single Family Home	2. Residential Subdivision	
	3.   Commercial/Industrial	4. Dock/Pier	
	5. Utilities	6. Coastal engineering Structure	
	7. Agriculture (e.g., cranberries, forestry)	8. Transportation	
	9. Other		
7b. Is any portion of the proposed activity eligible to be treated as a limited project (including Ecologic Restoration Limited Project) subject to 310 CMR 10.24 (coastal) or 310 CMR 10.53 (inland)?  1.   Yes  No  No  No  No  No  No  No  No  No  N			
	2. Limited Project Type  If the proposed activity is eligible to be treated as ar CMR10.24(8), 310 CMR 10.53(4)), complete and at Project Checklist and Signed Certification.		
8.	Property recorded at the Registry of Deeds for:		
	Middlesex County South	N/A	
	a. County	b. Certificate # (if registered land)	
	19911 c. Book	d. Page Number	
В.	Buffer Zone & Resource Area Impa	acts (temporary & permanent)	
1.	Buffer Zone Only – Check if the project is located Northead Western de Parks on Constant Res		
2.	Vegetated Wetland, Inland Bank, or Coastal Re  ☐ Inland Resource Areas (see 310 CMR 10.54-10 Coastal Resource Areas).		
	Charle all that apply balance Attach parrative and app	, accompanyting alabatica phagasilating have the	

Check all that apply below. Attach narrative and any supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.



For all projects affecting other Resource Areas, please attach a narrative explaining how the resource area was delineated.

## **Massachusetts Department of Environmental Protection**Bureau of Resource Protection - Wetlands

## WPA Form 3 - Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40 Town of Arlington Wetlands Protection Bylaw (Article 8)

Prov	ided by MassDEP:
٠	MassDEP File Number
	Document Transaction Number
	Arlington
	City/Town

## B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

Resource Area		Size of Proposed Alteration	Proposed Replacement (if any)		
а. 🗌	Bank	1. linear feet	2. linear feet		
b. 🗌	Bordering Vegetated Wetland	1. square feet	2. square feet		
с. 🗌	Land Under Waterbodies and	1. square feet	2. square feet		
	Waterways	3. cubic yards dredged			
Resour	ce Area	Size of Proposed Alteration	Proposed Replacement (if any)		
d. 🛛	Bordering Land	11± (gravel trench drain)	0		
	Subject to Flooding	1. square feet	2. square feet		
		O 3. cubic feet of flood storage lost	0 4. cubic feet replaced		
e. 🗌	Isolated Land	o. cubic reet of flood storage rost	4. Cubic feet replaced		
о. Ш	Subject to Flooding	1. square feet			
		2. cubic feet of flood storage lost	3. cubic feet replaced		
		Mill Brook (Inland)			
f. 🛚	Riverfront Area	1. Name of Waterway (if available) - spe	cify coastal or inland		
2.	Width of Riverfront Area	(check one):			
25 ft Designated Densely Developed Areas only					
☐ 100 ft New agricultural projects only					
200 ft All other projects					
5.105					
3. Total area of Riverfront Area on the site of the proposed project: $\frac{s, ros}{\text{square feet}}$					
4. Proposed alteration of the Riverfront Area:					
363±		0	363±		
a. 1	total square feet	b. square feet within 100 ft.	c. square feet between 100 ft. and 200 ft.		
5. Has an alternatives analysis been done and is it attached to this NOI? ☐ Yes ☐ No					
6. '	Was the lot where the activ	rity is proposed created prior to Aug	gust 1, 1996? ⊠ Yes ☐ No		
☐ Coastal Resource Areas: (See 310 CMR 10.25-10.35)					

3.

**Note:** for coastal riverfront areas, please complete **Section B.2.f.** above.



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Prov	rided by MassDEP:
	MassDEP File Number
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	Arlington
	City/Town

## B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

Check all that apply below. Attach narrative and supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

Online Users:
Include your
document
transaction
number
(provided on your
receipt page)
with all
supplementary
information you
submit to the
Department.

Resource Area		Size of Proposed	l Alteration	Proposed Replacement (if any)
а. 🗌	Designated Port Areas	Indicate size under Land Under		the Ocean, below
b. 🗌	Land Under the Ocean	1. square feet		
		2. cubic yards dredge	ed	
c. 🗌	Barrier Beach	Indicate size und	er Coastal Beacl	hes and/or Coastal Dunes below
d. 🗌	Coastal Beaches	1. square feet		2. cubic yards beach nourishment
е. 🗌	Coastal Dunes	1. square feet		2. cubic yards dune nourishment
		Size of Proposed	Alteration	Proposed Replacement (if any)
f g	Coastal Banks Rocky Intertidal	1. linear feet		
у. Ш	Shores	1. square feet		
h. 🗌	Salt Marshes	1. square feet		2. sq ft restoration, rehab., creation
i. 🗌	Land Under Salt Ponds	1. square feet		
		2. cubic yards dredge	ed	
j. 📙	Land Containing Shellfish	1. square feet		
k. 🗌	Fish Runs			s, inland Bank, Land Under the Waterbodies and Waterways,
		1. cubic yards dredge	ed .	
l. 🗌	Land Subject to Coastal Storm Flowage	1. square feet		
Restoration/Enhancement If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.2.b or B.3.h above, please enter the additional amount here.				
a. square feet of BVW			b. square feet of Sa	alt Marsh
☐ Project Involves Stream Crossings				
a. numb	er of new stream crossings		b. number of replace	rement stream crossings

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4.

5.



## WPA Form 3 - Notice of Intent

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Provided by MassDEP:			
	MassDEP File Number		
	Document Transaction Number		
	Arlington		
	City/Town		

oi otiioi /tppiioabio otaliaalao alla itogalioilioitto	C.	<b>Other</b>	<b>Applicable</b>	Standards and	Rec	uirements
--	----	--------------	-------------------	---------------	-----	-----------

	This is a proposal for an Ecological Restoration complete Appendix A: Ecological Restoration I (310 CMR 10.11).			
Str	reamlined Massachusetts Endangered Speci	es Act/Wetlands Protection Act Review		
1.	Is any portion of the proposed project located in <b>Estimated Habitat of Rare Wildlife</b> as indicated the most recent Estimated Habitat Map of State-Listed Rare Wetland Wildlife published by the Natural Heritage and Endangered Species Program (NHESP)? To view habitat maps, see the <i>Massachusetts Natural Heritage Atlas</i> or go to <a href="http://maps.massgis.state.ma.us/PRI_EST_HAB/viewer.htm">http://maps.massgis.state.ma.us/PRI_EST_HAB/viewer.htm</a> .			
a.  Yes No If yes, include proof of mailing or hand delivery of NOI to:				
	Natural Heritage and Er Division of Fisheries and 1 Rabbit Hill Road Westborough, MA 0158			
	If yes, the project is also subject to Massachusetts CMR 10.18). To qualify for a streamlined, 30-day, Not complete Section C.1.c, and include requested mate complete Section C.2.f, if applicable. If MESA supply by completing Section 1 of this form, the NHESP was up to 90 days to review (unless noted exceptions in	MESA/Wetlands Protection Act review, please terials with this Notice of Intent (NOI); OR elemental information is not included with the NOI, will require a separate MESA filing which may take		
	c. Submit Supplemental Information for Endangered Species Review*			
	1. Percentage/acreage of property to be a	Itered:		
	(a) within wetland Resource Area	percentage/acreage		
(b) outside Resource Area		percentage/acreage		
	2. Assessor's Map or right-of-way plan of	site		
2.	Project plans for entire project site, including wetland resource areas and areas outside of wetlands jurisdiction, showing existing and proposed conditions, existing and proposed tree/vegetation clearing line, and clearly demarcated limits of work **			
(a) Project description (including description of impacts outside of wetland resource area buffer zone)				
(b) Photographs representative of the site				

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<sup>\*</sup> Some projects **not** in Estimated Habitat may be located in Priority Habitat, and require NHESP review (see <a href="https://www.mass.gov/maendangered-species-act-mesa-regulatory-review">https://www.mass.gov/maendangered-species-act-mesa-regulatory-review</a>).

Priority Habitat includes habitat for state-listed plants and strictly upland species not protected by the Wetlands Protection Act.

<sup>\*\*</sup> MESA projects may not be segmented (321 CMR 10.16). The applicant must disclose full development plans even if such plans are not required as part of the Notice of Intent process.



## WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40 Town of Arlington Wetlands Protection Bylaw (Article 8)

Prov	ided by MassDEP:
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	City/Town

## C. Other Applicable Standards and Requirements (cont'd)

(c)					
Make	a-mesa-project-review). Make check payable to "Commonwealth of Massachusetts - NHESP" and <i>mail to NHESP</i> at above address				
Project	s altering <b>10 or more acres</b> of land, also sub	mit:			
(d)	Vegetation cover type map of site				
(e)	Project plans showing Priority & Estima	ated Habitat boundaries			
(f) Ol	R Check One of the Following				
1. 🗌	https://www.mass.gov/service-details/e	MESA exemption applies. (See 321 CMR 10.14, xemptions-from-review-for-projectsactivities-in-nt to NHESP if the project is within estimated d 10.59.)			
2. 🗌	Separate MESA review ongoing.	a. NHESP Tracking # b. Date submitted to NHESP			
3.	Separate MESA review completed. Include copy of NHESP "no Take" dete Permit with approved plan.	rmination or valid Conservation & Management			
For coasta		osed project located below the mean high water			
a. Not	applicable – project is in inland resource	area only b. 🗌 Yes 🔲 No			
If yes, incl	ude proof of mailing, hand delivery, or ele	ectronic delivery of NOI to either:			
South Shorthe Cape &	e - Cohasset to Rhode Island border, and Islands:	North Shore - Hull to New Hampshire border:			
Division of Marine Fisheries - Southeast Marine Fisheries Station Attn: Environmental Reviewer 836 South Rodney French Blvd. New Bedford, MA 02744 Email: dmf.envreview-south@mass.gov  Division of Marine Fisheries - North Shore Office Attn: Environmental Reviewer 30 Emerson Avenue Gloucester, MA 01930 Email: dmf.envreview-north@mass.gov					
please cor	Also if yes, the project may require a Chapter 91 license. For coastal towns in the Northeast Region, please contact MassDEP's Boston Office. For coastal towns in the Southeast Region, please contact MassDEP's Southeast Regional Office.				
c. 🗌 🏻 Is	this an aquaculture project?	d. 🗌 Yes 🛛 No			
If yes, incl	If yes, include a copy of the Division of Marine Fisheries Certification Letter (M.G.L. c. 130, § 57).				

3.



Online Users: Include your document transaction number

(provided on your receipt page) with all supplementary information you submit to the Department.

## **Massachusetts Department of Environmental Protection**Bureau of Resource Protection - Wetlands

## WPA Form 3 - Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40 Town of Arlington Wetlands Protection Bylaw (Article 8)

Provided by MassDEP:
MassDEP File Number
Document Transaction Number
Arlington
City/Town

## C. Other Applicable Standards and Requirements (cont'd)

4.	Is any port	ion of the pro	posed project within an Area of Critical Environmental Concern (ACEC)?
	a. 🗌 Yes	⊠ No	If yes, provide name of ACEC (see instructions to WPA Form 3 or MassDEP Website for ACEC locations). <b>Note:</b> electronic filers click on Website.
	b. ACEC		
5.			posed project within an area designated as an Outstanding Resource Water the Massachusetts Surface Water Quality Standards, 314 CMR 4.00?
	a. 🗌 Yes	⊠ No	
6.	Restriction	Act (M.G.L.	subject to a Wetlands Restriction Order under the Inland Wetlands c. 131, § 40A) or the Coastal Wetlands Restriction Act (M.G.L. c. 130, § 105)?
	a. Yes	⊠ No	
7.	Is this proj	ect subject to	provisions of the MassDEP Stormwater Management Standards?
			opy of the Stormwater Report as required by the Stormwater Management 10 CMR 10.05(6)(k)-(q) and check if:
	1. 🗌		Low Impact Development (LID) site design credits (as described in Management Handbook Vol. 2, Chapter 3)
	2. 🗌	A portion of	the site constitutes redevelopment
	3. 🗌	Proprietary	BMPs are included in the Stormwater Management System.
	b. No	o. Check why	the project is exempt:
	1. 🖾	Single-fami	y house
	2. 🗌	Emergency	road repair
	3.		lential Subdivision (less than or equal to 4 single-family houses or less than 4 units in multi-family housing project) with no discharge to Critical Areas.
D.	Addition	onal Info	mation
			Ecological Restoration Limited Project. Skip Section D and complete Restoration Notice of Intent – Minimum Required Documents (310 CMR
	Applicants	must include	the following with this Notice of Intent (NOI). See instructions for details.
			ne document transaction number (provided on your receipt page) for any of a you submit to the Department.
	su	fficient inform	map of the area (along with a narrative description, if necessary) containing ation for the Conservation Commission and the Department to locate the site. s may omit this item.)
	2. Pla	ans identifying	g the location of proposed activities (including activities proposed to serve as

a Bordering Vegetated Wetland [BVW] replication area or other mitigating measure) relative

to the boundaries of each affected resource area.

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## WPA Form 3 - Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40 Town of Arlington Wetlands Protection Bylaw (Article 8)

Prov	ided by MassDEP:
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	Arlington
	City/Town

D.	<b>Additional</b>	Information	(cont'd)
	/ taaitioilai	IIII OI III MUUUI	, oon it a

Auu					
3.		urce area boundary delineations (MassDEP BVW ability, Order of Resource Area Delineation, etc.), lology.			
4. 🖂	List the titles and dates for all plans and other	er materials submitted with this NOI.			
Cor	nservation Plan				
	lan Title				
Rol	ber Survey	Scott C. Lynch PLS.			
	repared By	c. Signed and Stamped by			
Dat	ted January 4, 2024	1"=20'			
d. F	inal Revision Date	e. Scale			
	nting Plan prepared by Holly Garden Design				
_(re\	vised February 20, 2024)	g. Date			
5.	If there is more than one property owner, ple listed on this form.	ease attach a list of these property owners not			
6.	Attach proof of mailing for Natural Heritage	and Endangered Species Program, if needed.			
7.	Attach proof of mailing for Massachusetts D	ivision of Marine Fisheries, if needed.			
8. 🛛	Attach NOI Wetland Fee Transmittal Form				
9.	Attach Stormwater Report, if needed.				
Fees					
1.	•	for projects of any city, town, county, or district Indian tribe housing authority, municipal housing ortation Authority.			
	nts must submit the following information (in ansmittal Form) to confirm fee payment:	addition to pages 1 and 2 of the NOI Wetland			
1493	,	2/14/2024			
	pal Check Number	3. Check date			
Paid ele	ectronically via eDEP				
	Check Number	5. Check date			
L.		Berggren			
6. Payor	name on check: First Name	7. Payor name on check: Last Name			

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## Massachusetts Department of Environmental Protection

Bureau of Resource Protection - Wetlands

## WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40 Town of Arlington Wetlands Protection Bylaw (Article 8)

Provided by MassDEP:

MassDEP File Number

**Document Transaction Number** 

Arlington

City/Town

## F. Signatures and Submittal Requirements

I hereby certify under the penalties of perjury that the foregoing Notice of Intent and accompanying plans, documents, and supporting data are true and complete to the best of my knowledge. I understand that the Conservation Commission will place notification of this Notice in a local newspaper at the expense of the applicant in accordance with the wetlands regulations, 310 CMR 10.05(5)(a).

I further certify under penalties of perjury that all abutters were notified of this application, pursuant to the requirements of M.G.L. c. 131, § 40. Notice must be made by Certificate of Mailing or in writing by hand delivery or certified mail (return receipt requested) to all abutters within 100 feet of the property line of the project location.

David Berggren S. Berggren 2/14/24 2. Date

3. Signature of Property Owner (if different)

5. Signature of Representative (if any)

4. Date

2/16/2024

6. Date

#### For Conservation Commission:

Two copies of the completed Notice of Intent (Form 3), including supporting plans and documents, two copies of the NOI Wetland Fee Transmittal Form, and the city/town fee payment, to the Conservation Commission by certified mail or hand delivery.

## For MassDEP:

One copy of the completed Notice of Intent (Form 3), including supporting plans and documents, one copy of the NOI Wetland Fee Transmittal Form, and a **copy** of the state fee payment to the MassDEP Regional Office (see Instructions) by certified mail or hand delivery.

#### Other:

If the applicant has checked the "yes" box in any part of Section C, Item 3, above, refer to that section and the Instructions for additional submittal requirements.

The original and copies must be sent simultaneously. Failure by the applicant to send copies in a timely manner may result in dismissal of the Notice of Intent.



## Massachusetts Department of Environmental Protection

Bureau of Resource Protection - Wetlands

## **NOI Wetland Fee Transmittal Form**

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

#### Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return





Α.	Applicant Info	ormation		
1.	Location of Project:			
	2 Reservoir Road		Arlington	
	a. Street Address		b. City/Town	
	Paid electronically v	ia eDEP	\$70.00	
	c. Check number		d. Fee amount	
2.	Applicant Mailing Ad	ddress:		
	Linnea and David		Berggren	
	a. First Name		b. Last Name	
	Homeowners			
	c. Organization			
	P. O. Box 750112			
	d. Mailing Address			
	Arlington Heights		MA	02474
	e. City/Town		f. State	g. Zip Code
	781-475-7099	N/A	lberggit@gmail.com	
	h. Phone Number	i. Fax Number	j. Email Address	
3.	Property Owner (if o	lifferent):		
	Same as Applicants			
	a. First Name		b. Last Name	
	c. Organization			
	d. Mailing Address			
	e. City/Town		f. State	g. Zip Code

To calculate filing fees, refer to the category fee list and examples in the instructions for filling out WPA Form 3 (Notice of Intent).

### B. Fees

h. Phone Number

Fee should be calculated using the following process & worksheet. *Please see Instructions before filling out worksheet.* 

j. Email Address

Step 1/Type of Activity: Describe each type of activity that will occur in wetland resource area and buffer zone.

Step 2/Number of Activities: Identify the number of each type of activity.

i. Fax Number

Step 3/Individual Activity Fee: Identify each activity fee from the six project categories listed in the instructions.

**Step 4/Subtotal Activity Fee:** Multiply the number of activities (identified in Step 2) times the fee per category (identified in Step 3) to reach a subtotal fee amount. Note: If any of these activities are in a Riverfront Area in addition to another Resource Area or the Buffer Zone, the fee per activity should be multiplied by 1.5 and then added to the subtotal amount.

Step 5/Total Project Fee: Determine the total project fee by adding the subtotal amounts from Step 4.

**Step 6/Fee Payments:** To calculate the state share of the fee, divide the total fee in half and subtract \$12.50. To calculate the city/town share of the fee, divide the total fee in half and add \$12.50.



## **Massachusetts Department of Environmental Protection**

Bureau of Resource Protection - Wetlands

## **NOI Wetland Fee Transmittal Form**

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

B. Fees (continued)			
Step 1/Type of Activity	Step 2/Number of Activities	Step 3/Individual Activity Fee	Step 4/Subtotal Activity Fee
Category 1a: work associated with a single-family dwelling	1.5 (Riverfront Area)	\$110.00	\$165.00
	-	otal Project Fee: Fee Payments:	\$165.00
		Project Fee:	\$165.00
		of filing Fee:	a. Total Fee from Step 5 \$70.00 b. 1/2 Total Fee <b>less</b> \$12.50
	City/Town share	e of filling Fee:	\$95.00

## C. Submittal Requirements

a.) Complete pages 1 and 2 and send with a check or money order for the state share of the fee, payable to the Commonwealth of Massachusetts.

Department of Environmental Protection Box 4062 Boston, MA 02211

b.) **To the Conservation Commission:** Send the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and the city/town fee payment.

**To MassDEP Regional Office** (see Instructions): Send a copy of the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and a **copy** of the state fee payment. (E-filers of Notices of Intent may submit these electronically.)

## **Bylaw Filing Fees and Transmittal Form**

## **Rules:**

- 1. Fees are payable at the time of filing the application and are non-refundable.
- 2.Fees shall be calculated per schedule below.
- 3. Town, County, State, and Federal Projects are exempt from fees.
- 4. These fees are in addition to the fees paid under M.G.L. Ch. 131, s.40 (ACT).

## **Fee Schedule** (ACC approved 1/8/15):

\$	No./Area	Category
		(R1) RDA- \$150 local fee, no state fee
<b>#200 00</b>		(N1) Minor Project - \$200 (house addition, tennis court, swimming pool,
\$200.00		utility work, work in/on/or affecting any body of water, wetland or
		floodplain).
		(N2) Single Family Dwelling - \$600
		(N3) Multiple Dwelling Structures - \$600 + \$100 per unit all or part of
		which lies within 100 feet of wetlands or within land subject to flooding.
		(N4) Commercial, Industrial, and Institutional Projects -
		\$800 + 50¢/s.f. wetland disturbed; 2¢/s.f. land subject to flooding or buffer
		zone disturbed.
		(N5) Subdivisions - \$600 + \$4/l.f. feet of roadway sideline within 100 ft. of
		wetlands or within land subject to flooding.
		(N6) Other Fees - copies, printouts; per public records law
		(N7) Minor Project Change - \$50
		(N8) Work on Docks, Piers, Revetments, Dikes, etc - \$4 per linear foot
		(N9) Resource Boundary Delineation (ANRAD) - \$1 per linear foot
		(N10) Certificate of Compliance (COC or PCOC) - No charge if before
		expiration of Order, \$200 if after that date.
		(N11) Amendments - \$300 or 50% of original local filing fee, whichever is
		less.
		(N12) Extensions -
		a. Single family dwelling or minor project - \$100.
		<b>b. Other</b> - \$150.
		(N13) Consultant Fee -per estimate from consultant
	TOTAL \$200.00	

**Note:** Submit this form along with the forms submitted for the ACT - the "Wetlands Filing Fee Calculations Worksheet," and the "Notice of Intent Fee Transmittal Form."

## **Legal Notice Charge Authorization**

DATE: 8/14/2024	
TO: legals@wickedlo	cal.com
I hereby authorize Community N Arlington Advocate newspaper o	ewspapers to bill me directly for the legal notice to be published in the n for a public hearing with the Arlington
Conservation Commission to rev 2 Reservoir Road	iew a project at the following location:
Thank you. Signed: David 1	Berggren K. Berggen
Send bill to: 2 Reservoir Road	(Address)
Arlington, MA 02474	
(781) 475-7099	(Phone)

### **Affidavit of Service**

I, Sharon A. Sullivan, being duly sworn, do hereby state as follows:

On <u>February 22, 2024</u>, I mailed a "Notification to Abutters" in compliance with the second paragraph of Massachusetts General Laws, Chapter 131, s.40, and the Arlington Wetlands Protection Bylaw, Title V, Article 8 of the Town of Arlington Bylaws in connection with the following matter:

Construction of an addition off the rear of a single-family dwelling, front entryway reconstruction, and landscaping and hardscaping at 2 Reservoir Road.

The form of the notification, and a list of the abutters to whom it was provided and their addresses, are attached to this Affidavit of Service.

Signed under the pains and penalties of perjury, this 22<sup>nd</sup> day of February 2024.

Sharon A. Sullivan

Permitting Technician

aron a Sullivan

[LEC File #: BerL\23-557.04]

February 22, 2024

#### **CERTIFIED MAIL**

«Name»

«Name2»

«Address»

«City», «State» «Zip»

**Notice of Intent Application** Re:

2 Reservoir Road

Assessor's Parcel ID: 60-2-5 Arlington, Massachusetts

#### Dear Abutter:

On behalf of the Applicants, Linnea and David Berggren, LEC Environmental Consultants, Inc. (LEC) has filed a Notice of Intent Application with the Arlington Conservation Commission to construct an addition off the rear of a single-family dwelling, reconstruct a front entryway, and conduct landscaping and hardscaping at 2 Reservoir Road. Portions of the proposed activities are located within the outer portion of Riverfront Area and Bordering Land Subject to Flooding associated with Mill Brook and within the 100-foot Buffer Zone to Bordering Vegetated Wetlands, as jurisdictional under the Massachusetts Wetlands Protection Act (the Act, M.G.L. c. 131, s. 40) and its implementing Regulations (the Act Regulations, 310 CMR 10.00), and the Town of Arlington Wetlands Protection Bylaw (Article 8, the Bylaw) and its Regulations Pursuant to the Town of Arlington Regulations for Wetlands Protection (the *Bylaw Regulations*).

The Notice of Intent Application and accompanying plans are available for review by contacting the Arlington Conservation Commission. The remote Public Hearing will be held on March 7, 2024 beginning at 7:00 p.m., in accordance with the provisions of the Act, Act Regulations, Bylaw, and Bylaw Regulations. Further information regarding this application will be published at least five (5) days in advance in The Arlington Advocate. Notice of the Public Hearing will also be posted at the Arlington Town Hall at least 48 hours in advance. Please check the Town's website and the Board/Committee's page for any updated information on the meeting.

Please do not hesitate to review the materials and/or attend the public hearing should you have questions or concerns about the proposed project.

Sincerely,

LEC Environmental Consultants, Inc.

Richard A. Kirby

Senior Wetland Scientist

LEC Environmental Consultants, Inc.

12 Resnik Road Suite 1

Plymouth, MA 02360 508.746.9491

380 Lowell Street Suite 101

Wakefield, MA 01880 781.245.2500

100 Grove Street Suite 302 Worcester, MA 01605 508.753.3077

P.O. Box 590 Rindge, NH 03461

603.899.6726

680 Warren Avenue Suite 3

**EAST PROVIDENCE, RI** 

www.lecenvironmental.com

East Providence, RI 02914 401.685.3109 137 of 238

PLYMOUTH, MA

WAKEFIELD, MA

WORCESTER, MA

401.685.3109

#### **Abutter Notification**

# Notification to Abutters Under the Massachusetts Wetlands Protection Act and the Arlington Wetlands Protection Bylaw

In accordance with the second paragraph of Massachusetts General Laws Chapter 131, Section 40 and the Arlington Wetlands Protection Bylaw, you are hereby notified of the following:

The Conservation Commission will hold a virtual public meeting using Zoom on Thursday, March 7, 2024, at 7:00 p.m. in accordance with the provisions of the Massachusetts Wetlands Protection Act (M.G.L. Ch. 131, s. 40, as amended) and the Town of Arlington Bylaws Article 8, Bylaw for Wetland Protection, and in accordance with the Governor's Order Suspending Certain Provisions of the Open Meeting Law, G. L. c. 30A, § 20 relating to the COVID-19 emergency, for a Notice of Intent Application from Linnea and David Berggren to construct an addition off the rear of a single-family dwelling, reconstruct a front entryway, and conduct landscaping and hardscaping within the outer portion of Riverfront Area and Bordering Land Subject to Flooding associated with Mill Brook and within the 100-foot Buffer Zone to Bordering Vegetated Wetlands at 2 Reservoir Road (Assessor's Property Map 60-2-5). Please refer to the Commission's online meeting agenda for specific Zoom meeting access information.

A copy of the application and accompanying plans are available by request by contacting the Arlington Conservation Commission at 781-316-3012 or <a href="mmuszynski@town.arlington.ma.us">mmuszynski@town.arlington.ma.us</a>. For more information, call the Applicant's representative, LEC Environmental Consultants, Inc., at 781-245-2500 or the Arlington Conservation Commission at 781-316-3229, or the DEP Northeast Regional Office at 978-694-3200.

NOTE: Notice of the Public Hearing will be published at least five (5) business days in advance in *The Arlington Advocate* and will also be posted at least 48 hours in advance in the Arlington Town Hall.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*



## **CERTIFIED ABUTTERS LIST**

Date: January 26, 2024

Subject Property Location: 2 RESERVOIR RD Arlington, MA

Subject Property ID: 60-2-5 Search Distance: 100 Feet

Parcel ID	Property Location	Owner 1	Owner 2	Mailing Address	Mail 2	City/Town	State	Zip
60-1-11.A	1395 MASS AVE	SZR ARLINGTON, MA	ASSISTED LIVING, L.L.C	C/O ALTUS/VENTAS #4051	PO BOX 71970	PHOENIX	AZ	85050
60.A-4-2	10-12 NOURSE ST UNIT 2	FORGIE WENDY		10 NOURSE ST #2		ARLINGTON	MA	02474
60.A-4-1	10-12 NOURSE ST UNIT 1	CLARK MICHAEL A	SHERBURNE ABIGAIL	12 NOURSE ST		ARLINGTON	MA	02474
60.A-3-9	9 NOURSE ST UNIT 9	KISHCHENKO ROMAN & YULIA		9 NOURSE ST		ARLINGTON	MA	02474
60.A-3-11	11 NOURSE ST UNIT 11	RYU KEVIN KYUNGBUM &	CHUNG HYEMIN	11 NOURSE ST		ARLINGTON	MA	02474
60.A-4-14	14 NOURSE ST UNIT 14	SANDROF BENJAMIN	HOPPER MOLLY	14 NOURSE ST		ARLINGTON	MA	02474
60.A-4-16	16 NOURSE ST UNIT 16	GRANUCCI CARMINE A	GRANUCCI RAMONA E NICHOLS	16 NOURSE ST		ARLINGTON	MA	02474
60.A-4-18	18-20 NOURSE ST UNIT 18	GAUDET JAMIE-LYN	CHEN DANIEL	18 NOURSE ST		ARLINGTON	MA	02474
60.A-4-20	18-20 NOURSE ST UNIT 20	LABO NICOLE L	OKINOW MAX E	20 NOURSE ST		ARLINGTON	MA	02474
60-1-2	41-45 PARK AVE	ARLINGTON COAL & LUMBER CO		41 PARK AVE		ARLINGTON	MA	02476
60-1-11	1389 MASS AVE	MASS BAY TRANSIT AUTHORITY		10 PARK PLZ	STE 5610	BOSTON	MA	02116
60-2-2	14 RESERVOIR RD	WRIGHT SUSAN J/ LIFE ESTATE		14 RESERVOIR RD		ARLINGTON	MA	02474
60-2-3	10 RESERVOIR RD	MARKELZ JOHN W III &	MARKELZ MAUREEN A	10 RESERVOIR RD		ARLINGTON	MA	02474
60-2-4	6 RESERVOIR RD	ZAGANJORI SAMIR & KIMBERLY W		6 RESERVOIR RD		ARLINGTON	MA	02474
60-2-5	2 RESERVOIR RD	BERGGREN DAVID E		PO BOX 750112		ARLINGTON	MA	02475
60-3-5	15 NOURSE ST	JENNINGS WILLIAM C/WENDY S		15 NOURSE ST		ARLINGTON	MA	02474
60-3-6	11 RESERVOIR RD	BIALACH JAN/ LIFE ESTATE		11 RESERVOIR RD		ARLINGTON	MA	02474
60-4-1	22-24 NOURSE ST	KALAJIAN TAMI/GARY		22-24 NOURSE ST		ARLINGTON	MA	02474

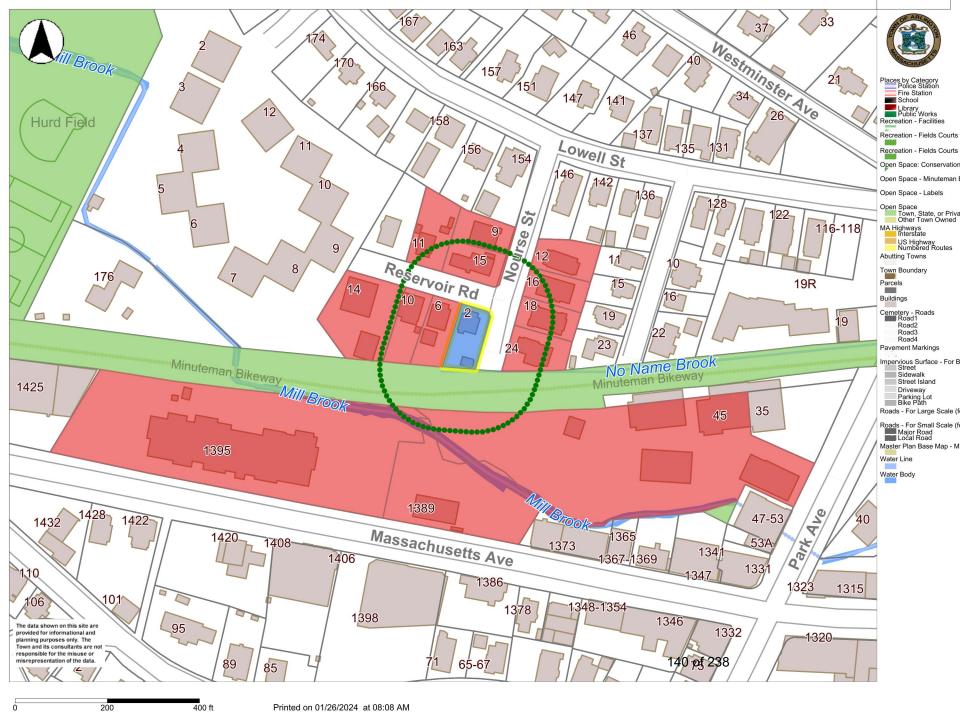
The Board of Assessors certifies the names and addresses of requested parties in interest, all abutters to subject parcel within 100 feet.



Office of the Board of Assessors
Town of Arlington
730 Massachusetts Ave
Arlington, MA 02476

phone: 781.316.3050

email: assessors@town.arlington.ma.us





PLYMOUTH, MA

WAKEFIELD, MA

## Notice of Intent Application & Wetland Resource Area Analysis

2 Reservoir Road Assessor's Parcel ID: 60-2-5 Arlington, Massachusetts

February 21, 2024

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RINDGE, NH

EAST PROVIDENCE, RI

WORCESTER, MA



#### 1. Introduction

On behalf of the Applicants and Property Owners, Linnea and David Berggren, LEC Environmental Consultants, Inc., (LEC) is filing the enclosed Notice of Intent (NOI) Application with the Arlington Conservation Commission under the *Massachusetts Wetlands Protection Act* (M.G.L. c. 131, s. 40, the *Act*), its implementing Regulations (310 CMR 10.00, the *Act Regulations*), the *Town of Arlington Wetlands Protection Bylaw* (Article 8, the *Bylaw*), and its implementing *Wetlands Protection Regulations* (March 16, 2024, the *Bylaw Regulations*). The Applicants are filing this NOI Application to construct an addition off the rear of a single-family dwelling, renovate a front porch, and conduct hardscaping and landscaping activities. The proposed activities are located within Riverfront Area and Bordering Land Subject to Flooding associated with Mill Brook, and within the 100-foot Buffer Zone to Bordering Vegetated Wetlands.

As part of this filing, the Applicants propose to implement mitigation measures, including erosion controls to protect adjacent resource areas during construction, stormwater management, and a native restoration planting plan to improve existing site conditions and promote climate resiliency. The proposed conditions are depicted on a *Conservation Plan* dated January 4, 2024 and prepared by Rober Survey PLS (Appendix B). Details of the landscape and restoration effort can be found on a *Planting Plan* dated January 20, 2024 and revised February 20, 2024 and prepared by Holly Garden Design (Appendix C).

## 2. General Site Description

The 5,129± square foot property is located south of Lowell Street, west of Park Avenue, southeast of Arlington Reservoir, and north of Massachusetts Avenue, within the northwestern portion of Arlington. More specifically, the property is located southwest of the Reservoir Road and Nourse Street intersection. The Minuteman Commuter Bikeway borders the property to the south, while residential development associated with Reservoir Road and Nourse Street occurs to the north, east, and west. Commercial development associated with Massachusetts Avenue occurs south of the Bikeway. Mill Brook flows off-site in a southeasterly direction adjacent to the Bikeway.

The property contains a 2-story, single-family dwelling along Reservoir Road, with a detached 1-car garage located in the backyard and accessed via a curb cut along Nourse

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Street. A paved driveway extends southerly from Reservoir Road, along the eastern side of the dwelling. An enclosed porch occurs off the northern side of the house with stairs descending to a concrete sidewalk. A concrete walkway also extends from the Nourse Street sidewalk, providing access to the rear dwelling entrance. A white picket fence occurs along the western property boundary, while a 6-foot-tall privacy fence extends along the western and southern boundaries. The dwelling and associated appurtenances are surrounded by lawn and landscaped areas. Landscape plants include rhododendron and azalea (*Rhododendron* spp.), forsythia (*Forsythia* sp.), American holy (*Ilex opaca*), rose (*Rosa* sp.). and lily of the valley (*Pieris japonica*). Individual shade trees and saplings including Norway maple (*Acer platanoides*), black walnut (*Juglans nigra*), and silver maple (*Acer saccharinum*) occur throughout. A scrub-shrub wetland occurs offsite to the southeast along the Minuteman Bike Path, and is located within a drainage ditch named No-Name Brook on the Arlington GIS.

Topography gently descends southerly from Reservoir Road toward the backyard, with an elevation grade of roughly 4 feet. A comparatively steep slope descends from the southern property boundary towards the Minuteman Bike Path.

A band of forested uplands occurs along the southern property boundary. Vegetation within the forested uplands contains individuals of northern red oak (*Quercus rubra*) and Norway maple, with an individual silver maple. The understory contains patches of Japanese knotweed (*Reynoutria japonica*) and a sparse groundcover containing scattered grasses (*Poaceae* sp.).

Using a hand-held, Dutch-style soil auger, LEC inspected soil conditions within the low-lying upland areas and observed a 14+ inch thick, loamy sand historic fill horizon (C horizon) with a soil matrix color ranging from 10YR 3/2 to 10YR 3/4. No redoximorphic features or other indicators of hydrology were observed and refusal (likely stones used as fill material when the lot was developed) was generally encountered at 15 inches. Accordingly, the soil profile is not considered hydric according to *Field Indicators for Identifying Hydric Soils in New England* (Version 4, June 2020, the *Field Indicators Guide*).

#### 2.1 Natural Heritage and Endangered Species Program Designation

According to the 15<sup>th</sup> Edition of the *Massachusetts Natural Heritage Atlas* (effective August 1, 2021) published by the Natural Heritage & Endangered Species Program (NHESP), no areas of Estimated Habitats of Rare Wildlife or Priority Habitat of Rare

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PLYMOUTH, MA WAKEFIELD, MA WORCESTER, MA RINDGE, NH EAST PROVIDENCE, RI



Species, or Potential or Certified Vernal Pools exist on or in proximity to the property (Appendix A, Figure 3).

## 3. Wetland Boundary Determination Methodology

LEC conducted site evaluations on December 7 and 13, 2024 to identify and characterize existing protectable Wetland Resource Areas located on or immediately adjacent to the site, and to delineate the BVW associated with No-Name Brook and the Bank-Mean Annual High Water (MAHW) Line associated with Mill Brook. The extent of Wetland Resource Areas was determined through observations of existing plant communities, hydrologic indicators, and Bankfull indicators in accordance with the *Act*, its implementing *Regulations*, the *Bylaw*, and the *Bylaw Regulations*. The FEMA *Flood Insurance Rate Maps* and associated topographic site survey informed the extent of BLSF on the property.

Based on these methods and review of pertinent maps, LEC delineated the BVW boundary with sequentially numbered, blaze orange surveyor's tape with the words "LEC Resource Area" and/or orange wire utility flags with "LEC" printed in black, and numbered 1 through 3. LEC flagging stations were survey located by Rober Survey, and are depicted on the *Conservation Plan* (Appendix B).

The Bank-MAHW Line to Mill Brook occurs along a stone retaining wall offsite to the south which was survey located by Rober Survey and depicted on the *Conservation Plan*. All but the northeast corner of the property is within Riverfront Area.

#### 3.1 Plant Species Identification

LEC identified plant species comprising 5% or more of the vegetative cover along the BVW boundary. Identifications were made to the species level when morphologically possible and were used along with other hydrologic indicators to define the BVW boundary in accordance with definitions and criteria in 310 CMR 10.55(2).

## 3.1.1. Identification of Wetland Indicator Species

The regional wetland indicator status for all identified plant species was obtained from the classification system described in *State of Massachusetts 2016 Wetland Plant List* (Lichvar, R.W, et al. 2016). This classification system divides plant species into ten categories and identifies the wetland indicator status based on the frequency of their

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occurrence in wetland habitat. These include, in order of lowest to highest frequency within wetlands:

Facultative Upland (FACU), Facultative (FAC), Facultative Wetland (FACW), and Obligate (OBL).

Plant species with a FAC, FACW or OBL wetland indicator status occur in wetlands more than 50% of the time and are considered "wetland indicator plants." Plant species with a FACU wetland indicator status, and those not contained within the list occur in wetlands less than 50% of the time, are <u>not</u> considered "wetland indicator plants." This system of classification has been adopted by the Department of Environmental Protection (DEP) as the definitive source regarding the indicator status of wetland plants.

#### 3.1.2 Measurement of Relative Abundance

The relative abundance or percent cover of each plant species occurring along the BVW boundary was determined visually. When completing DEP BVW (310 CMR 10.55) Delineation Field Data Forms, midpoints were utilized to determine the percent cover of each plant species according to the following classification system: 3% = 1-5%; 10.5% = 6-23%; 20.5 = 16-25%; 38% = 26-50%; 63% = 51-75%; 85.5% = 76-95%; and 98% = 96-100%. The purpose of using midpoints is to reduce variability between wetland scientists when visually determining percent cover. Utilizing midpoints does not affect whether a given species within a sample layer will be a dominant plant and is recommended in DEP's handbook, *Massachusetts Handbook for Delineation of Bordering Vegetated Wetlands*, (Second edition September 2022).

### 3.1.3 Measurement of Vegetative Distribution and Density

The relative pattern of plant distribution within each vegetative layer (canopy, sapling, shrub, lianas, and groundcover) was visually determined. Plant species within each layer were determined to occur as single plants, patches or clusters, entanglements, or as the dominant plant species. In addition, LEC observed the relative plant density between each vegetation layer, noting whether the sample layer is densely vegetated, contains moderately dense vegetation, is variably dense within the sample layer, or is sparsely vegetated.

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### 3.2 Evaluation of Edaphic (Soil) Characteristics

### 3.2.1 General Soil Analysis

Prior to conducting the site evaluation, LEC reviewed United States Geologic Survey (USGS) Topographic Maps and United States Natural Resources Conservation Service (NRCS) Soil Survey Maps. The purpose of this review was to become familiar with the site's general soil characteristics. During site reconnaissance, LEC determined the approximate location of the BVW boundary and determined which areas along the BVW boundary would best represent the upland and wetland portions of the site. Using a Dutch-style, hand-held auger and/or spade, LEC investigated soil conditions within these representative areas by digging a test pit to a depth of at least 20 inches, or refusal. The purpose of this investigation was to confirm and document the difference in soil conditions between the wetland and adjacent upland areas. Specifically, LEC analyzed soil horizon thickness and depth, soil texture, and soil color, noting the presence or absence of redoximorphic features in accordance with *Massachusetts Handbook for Delineation of Bordering Vegetated Wetlands* (Second Edition, September 2022), and *Field Indicators for Identifying Hydric Soils in New England* (June 2020).

### 3.2.2 Soil Horizon Thickness and Depth

LEC noted the presence of all soil layers and horizons (e.g., O, A, E, B, and/or C) and their relative thickness and depth within the test pit. The thickness of the O soil layer may be directly related to wetness and is critical to the identification of a hydric soil. Specifically, histosols (organic soil layers measuring greater than 16 inches thick) and soils with a histic epipedon (an organic layer between 8 and 16 inches thick) always qualify as hydric soils, provided the hydrology that created these soil conditions still exists and has not been altered. Although not directly related to wetness, the thickness of the A or  $A_p$  horizons is a function of the depth of plowing (many of New England's forests today were historically agricultural fields) and/or a function of erosion and deposition of organic matter. Interpreting redoximorphic features within the A or  $A_p$  horizons can be difficult given their relatively dark color. Redoximorphic features are best observed in the soil layers beneath the A or  $A_p$  horizons.

#### 3.2.3 **Soil Texture**

Soil texture refers to the relative proportions of sand, silt, and clay particles in the soil.

Although there are several standard systems for determining soil texture, LEC utilized the United States Department of Agriculture (USDA) system, because it is widely accepted

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PLYMOUTH, MA WAKEFIELD, MA WORCESTER, MA RINDGE, NH EAST PROVIDENCE, RI



and referred to in the *Field Indicators Guide* referenced above. Specifically, LEC identified whether the soil is classified as sand, loamy sand, sandy loam, loam, silt loam, silty clay loam, or clay. LEC also estimated the relative proportion of organic matter within the topsoil to determine if the soil is classified as an organic soil. Differences in soil texture affect how water moves through the soil and the type of hydrologic indicators that form when hydric conditions are present during the growing season.

### 3.2.4 Soil Color

Using the Munsell® Soil Color Charts, LEC examined the hue, value, and chroma of the different soil horizon matrixes (dominant soil color) and redoximorphic features present within the test pits. The purpose of examining the soil color within the A or A<sub>p</sub> horizon is to determine whether these horizons are rich in organic material and meet the criteria for dark or very dark. This distinction refers to the relative amount of organic matter within the soil horizon and may indicate the presence of saturated conditions during the growing season.

Within the B and/or C horizons, the soil color and color patterns may indicate the movement of iron and/or other minerals within the soil. The movement and/or concentration of iron and other minerals, such as manganese, may indicate hydric conditions persist during the growing season. Specifically, a soil matrix color with a relatively low chroma (chroma 2 or less) and high value (value 4 or more) due to wetness is often defined as a depleted matrix - the iron and/or other minerals have been removed or depleted from the soil due to groundwater fluctuations, soil saturation, and reduction. A soil with a depleted matrix due to wetness within the upper 20 inches will likely constitute a hydric soil.

### 3.2.5 Redoximorphic Features

During the soil evaluation, LEC documented the presence or absence of redoximorphic features within the soil sample. Redoximorphic features are changes in soil color and/or texture that contrast from the matrix color and dominant soil texture and include redox depletions (formerly referred to as "low-chroma mottles"), redox concentrations (formerly referred to as "high-chroma mottles"), nodules, concretions, pore linings, and oxidized rhizospheres. Redoximorphic features form through the processes of reduction, translocation, and oxidation of Fe and Mn oxides when groundwater levels fluctuate near the soil surface. Commonly observed redoximorphic features include redox depletions, occurring when minerals in the soil are reduced or removed, and redox concentrations or soil masses, occurring when minerals accumulate. Less commonly observed

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redoximorphic features include nodules and concretions, which are hardened, cemented soil masses. Pore linings are localized areas of brightly colored soils located adjacent to a pore within the soil. Oxidized rhizospheres are a form of pore lining that occurs on the surface of live roots of certain plants.

### 4. Wetland Resource Areas

Wetland Resource Areas associated with the site include Bordering Vegetated Wetlands, Bank/Mean Annual High Water, Riverfront Area, and Bordering Land Subject to Flooding. The 200-foot Riverfront Area extends from the Bank-MAHW Line, and the 100-foot Buffer Zone extends from the BVW boundary. The Wetland Resource Areas are further described below.

### 4.1 Bordering Vegetated Wetlands

According to the *Act Regulations* [310 CMR 10.55(2)], Bordering Vegetated Wetlands are defined as: *freshwater wetlands which border on creeks, rivers, streams, ponds, and lakes...* Bordering Vegetated Wetlands are areas where the soils are saturated and/or inundated such that they support a predominance of wetland indicator plants... The boundary of Bordering Vegetated Wetlands is the line within which 50% or more of the vegetational community consists of wetland indicator plants and saturated or inundated conditions exist.

According to the *Bylaw Regulations* [Section 22 B. (1) and (2)], Vegetated Wetlands *are* freshwater wetlands, including both bordering vegetated wetlands (i.e., bordering on freshwater bodies such as on creeks, rivers, streams, ponds and lakes), and isolated vegetated wetlands which do not border on any permanent water body. The types of freshwater wetlands are wet meadows, marshes, swamps, bogs and vernal pools.

Vegetated Wetlands are areas where soils are saturated and/or inundated such that they support a predominance of wetland indicator plants. The ground water and surface water hydrological regime, soils and the vegetational community which occur in each type of freshwater wetlands, including both bordering and isolated vegetated wetlands, are defined under the Bylaw based on G.L. c. 131, § 40. (2) The boundary of Vegetated Wetland, whether Bordering or Isolated, is the line within which 50% or more of the vegetational community consists of wetland indicator plants and saturated or inundated conditions exist. Wetland indicator plants shall include but not necessarily be limited to those plant species identified in the Act.

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Easterly view of the BVW and the Minuteman Bike Path.

A narrow band of scrub-shrub wetlands bordering an off-site drainage swale (intermittent stream) occurs southeast of the property, adjacent to the Minuteman Bike Path. The sparse canopy contains scattered individuals of silver maple, and American elm (*Ulmus americana*). The

understory contains patches of silky dogwood (*Cornus amomum*), Japanese knotweed, and green ash saplings (*Fraxinus pennsylvanica*). The ground cover contains patches of purple loosestrife (*Lythrum salicaria*), deer tongue grass (*Dichanthelium clandestinum*), buttercup (*Ranunculus* sp.), and various grasses (*Poaceae* spp.).

LEC inspected soils within the BVW using a hand-held, Dutch-style auger and observed an 8-10-inch-thick mucky loamy sand topsoil (A horizon) with a soil matrix color of 10YR 2/1. The topsoil was underlain by a 6+ inch thick, depleted mucky sandy loam subsoil (B<sub>g</sub> Horizon) with a soil matrix color of 10YR 3/1. The soil was saturated to the surface at the time of LEC's delineation. This soil profile is considered hydric in accordance with the *Field Indicators Guide* as it meets the indicator A11: Depleted Below Dark Surface.

While this wetland area is referred to as No-Name Brook on the Arlington GIS, the drainage swale is not depicted on the current USGS Topographic Map, and LEC was unable to apply the USGS StreamStats program to determine the watershed area or 99% flow duration since there is no stream centerline available. Considering the adjacent proximity of Mill Brook, the limited watershed area contributing to this wetland, and our observations of drainage swale-like character of the wetland along the Bikeway, it is very unlikely that No-Name Brook qualifies as a perennial stream under the *Act* and/or *Bylaw*.



### 4.2 Bank-Mean Annual High Water

According to the Act Regulations [310 CMR 10.54(2)], Bank is defined as the portion of the land surface which normally abuts and confines a water body. It occurs between a water body and a vegetated bordering wetland and adjacent flood plain, or, in the absence of these, it occurs between a water body and an upland... The upper boundary of a Bank is the first observable break in the slope or the mean annual flood level, whichever is lower. The lower boundary of a Bank is the mean annual low flow level.

According to the *Bylaw Regulations*, [Section 4 B (10)] Bank is defined as *the portion of* the land surface which normally abuts and confines a water body, often between the mean annual low flow level and the first observable break in the slope or the mean annual flood level, whichever is lower.

According to the Act Regulations [310 CMR 10.58 (2) (a) 2.], Mean Annual High-water Line of a river is the line that is apparent from visible markings or changes in the character of soils or vegetation due to the prolonged presence of water and that distinguishes between predominantly aquatic and predominantly terrestrial land. Field indicators of bankfull conditions shall be used to determine the mean annual high-water line. Bankfull field indicators include but are not limited to: changes in slope, changes in vegetation, stain lines, top of pointbars, changes in bank materials, or bank undercuts.

Mean Annual High Water is not defined in the *Bylaw* so the above definition prevails.



Easterly view of Mill Brook and retaining wall (left).

The northern Bank-MAHW Line associated with Mill Brook occurs along a concrete retaining wall adjacent to a parking lot associated with Arlington Coal and Lumber. The brook is contained within a roughly 15-foot wide channel and the Bank-MAHW Line is coincident with the retaining wall.

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### 4.3 Riverfront Area

According to the Act Regulations [310 CMR 10.58 (2) (a)], Riverfront Area is defined as the area of land between a river's mean annual high water line and a parallel line measured horizontally 200 feet away. The riverfront area may include or overlap other resource areas or their buffer zones. The riverfront area does not have a buffer zone.

According to the Bylaw (Section 9 L) "Riverfront Area" shall mean the area of Land between a river's mean annual high water line and a parallel line measured 200 feet horizontally landward of the mean annual high water line.

Riverfront Area includes land within 200 feet of the Bank-MAHW line associated with Mill Brook and encompasses the majority of the property. This 5,105± square foot area includes the existing dwelling, garage, driveway, site appurtenances, and surrounding lawn area. The portion of the property north of the narrow band of forested upland is considered 'Previously Developed' and the footprints of the existing dwelling, driveway, landing, stairs, walkways, and garage are considered 'Degraded' in accordance with 310 CMR 10.58 (5).

### 4.4 Bordering Land Subject to Flooding

According to the *Act Regulations* [310 CMR 10.57 (2) (a) 1], Bordering Land Subject to Flooding (BLSF) is defined as an area with low, flat topography adjacent to and inundated by flood waters rising from creeks, rivers, streams, ponds or lakes. It extends from the banks of these waterways and water bodies; where a bordering vegetated wetland occurs, it extends from said wetland.

According to the Bylaw Regulations [Section 24(B)(1)(c)], The boundary of Bordering Land Subject to Flooding is the estimated or observed maximum lateral extent of floodwater which will theoretically result or has resulted from the statistical 1%-annual-chance flood. Said boundary shall be that determined by reference to the most recently available flood profile data prepared for the Town of Arlington within which the work is proposed under the Federal Emergency Management Agency's National Flood Insurance Program (NFIP). Said boundary, so determined, shall be presumed accurate. This presumption may be overcome only by credible evidence from a registered professional engineer or other professional competent in such matters.

According to the June 4, 2010 Federal Emergency Management Agency National Flood Hazard Layer FIRMette for Middlesex Couty, Massachusetts (Map No: 25017C0416E, Appendix A, Figure 2), the southeastern corner of the property is located within Zone

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AE: Special Flood Hazard Areas (SFHAs) subject to Inundation by the 1% Annual chance Flood; Base Flood Elevations determined. According to the FIRMette, the Zone AE occurs at Elevation 154 (Datum: NAVD 88). Therefore, land extending from the BVW and/or Bank-MAHW Line to the Elevation 154 is jurisdictional as BLSF as depicted on the Conservation Plan. BLSF occurs within the southeastern corner of the site and bifurcates the detached garage.

### 5. Proposed Activities

The Applicants propose to construct a 16' x 26.5' (418 sq ft) addition off the rear of the existing dwelling. A stone retaining wall, stairs, and landing are proposed adjacent to the addition, while the front entry and walkway will be renovated and slightly enlarged.

The footprint of the proposed activities is entirely contained within the existing concrete walkway behind the dwelling and lawn/landscaped land. Minor grading is proposed to accommodate the stone retaining wall. A porous paver landing is proposed adjacent to the stone retaining wall, while a pervious pad for the HVAC unit will be installed along the western side of the addition. The porous paver landing will be installed according to the detail provided in the *Conservation Plan*.

The addition and the proposed retaining wall are located closer to the BVW and Mill Brook than existing conditions; however, both will be located outside the 50-foot No-Structure Zone. The addition will be supported by a concrete foundation and measure 64 feet from the wetland boundary at its closest point (LEC flag #2), and roughly 139.7 feet from Mill Brook.

While the proposed addition measures  $418\pm$  square feet, the impervious area on the site only increases by  $316\pm$  square feet (from  $1,556\pm$  to  $1,872\pm$  square feet). This is achieved by reducing the size of the driveway, and since a portion of the addition footprint is currently impervious. The Applicants propose to reduce the footprint of the driveway from  $315\pm$  square feet to  $277\pm$  square feet and convert this area to lawn as shown on the *Planting Plan* (Appendix C).





Northerly view of proposed addition location and the existing backyard.

### 5.1 Tree Removal and Landscaping



Northwesterly view of trees to be removed.

The Applicants propose to remove eight trees to accommodate the foundation for the proposed addition and landscaping activities. More specifically, seven Norway maples (Acer platanoides) and one black walnut tree (Juglans nigra) will be removed within the backyard,

southwest of the existing dwelling, as depicted on the *Conservation Plan* and *Planting Plan*. All of the proposed trees to be removed are < 8" in DBH, are located in the 50 to 100 foot Buffer Zone and outer 100 to 200 foot Riverfront Area and will be replaced as discussed below in Section 6.3. Additionally, the Applicants propose to implement a native landscape plan which includes native sapling trees, shrubs, and groundcover plantings intended to restore Riverfront Area and improve the aesthetic of the backyard.

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### 6. Mitigation Measures

The Applicants intend to implement erosion controls to protect the resource areas during construction, and provide stormwater management and Riverfront Area Restoration to improve existing site conditions and promote climate resiliency. These mitigating measures are intended to meet or exceed the regulatory requirements enumerated in the *Act Regulations* and the *Bylaw Regulations*. A description of each of these mitigating measures is provided below.

### 6.1 Erosion and Sedimentation Control

The Applicants propose to implement an erosion control program to protect the BVW and Mill Brook and adjacent properties from sedimentation during construction activities. The plan for the control of potential impacts to the adjacent Wetland Resource Areas is based on DEP guidelines and will be comprised of staked compost filter tubes surrounding the proposed work area. The compost filter tubes will be installed along the limit of work line around the proposed addition and the sides of the dwelling and driveway. Silt sacks will be installed within the down-gradient catch basins along Norse Street. All erosion control measures will remain in place until disturbed areas are stabilized by vegetation. The location of the proposed erosion controls are shown on the *Conservation Plan* (Appendix B).

### 6.2 Stormwater Management

Under existing conditions, no stormwater management occurs on the property for impervious areas, and the proposed increase of impervious surface does not exceed the 350 square-foot threshold that requires stormwater management. The Applicants propose to infiltrate stormwater run-off by installing two gravel trench drains in the design. The two trench drains are proposed south of the addition and on the eastern and western sides of the detached garage. These trench drains will capture and infiltrate roof runoff from the proposed addition, a portion of the existing dwelling, and the entire garage. Runoff from the garage will be captured and directed to the trench drain via a gutter and downspout. The trench drains measure 2 feet wide and 1.5 feet deep and contain 34'' to 1/2'' washed stone. Details and location of the proposed trench are shown on the *Conservation Plan*.

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### 6.3 Restoration Planting Plan

The Applicants propose to restore and enhance 735± square feet of Riverfront Area in the southern portion of the property by removing lawn and installing native saplings, shrubs, and groundcover plants. Specifically, the existing lawn grass will be removed and planted with 5 native trees, 3 native shrubs, and 107 native ferns and perennials. The native sapling trees, shrubs, and groundcover plantings are largely derived from the *Recommended Native Plant Materials List* published by the Arlington Conservation Commission in 2014. The one cultivar included, Dark American Arborvitae, *Thuja occidentalis* 'Nigra,' is intended to also provide screening from the Bikeway, and will not significantly change the wildlife habitat function and values. This restoration effort intends to improve the function and value of the Riverfront Area and Buffer Zone compared to existing conditions by establishing a native restoration/enhancement area within the southern portion of the property.

The Applicants also propose vegetation replacement to mitigate for the eight trees to be removed as part of the project, and to conform to Section 25 of the *Bylaw Regulations*. Seven of the eight trees proposed to be removed are Norway maples which are listed on the *Massachusetts Prohibited Plant List* published by the Massachusetts Invasive Plant Advisory Group. The Applicants propose to plant eight trees to replace the ones to be removed:

- Seven sweetgum (Liquidambar styracifolia 'Slender Sihouette')
- One pink dogwood (*Cornus* 'Rutgan')



Southerly view of area to be restored to native vegetation.

Given that seven of the eight trees to be removed are invasive and the limited space on site for additional replacement trees, the Applicants are providing additional restoration in the form of converting lawn to naturally vegetated area as discussed above.

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This additional mitigation along with the eight replacement trees will improve the natural capacity of the resource area to protect and promote the interests of the *Bylaw*, and is commensurate with the size and scope of the project. A row of boulders will be installed to permanently demarcate the restoration/enhancement area. Please refer to the *Planting Plan* for additional details and specifications. The restoration area and replacement trees will be monitored for survivability for three growing seasons by a qualified consultant as specified in the *Bylaw Regulations*.

### 7. Regulatory Performance Standards

The *Act Regulations* and *Bylaw Regulations* provide specific performance standards for work within Riverfront Area and BLSF, and the *Bylaw Regulations* provide additional standards for climate resiliency. Citations of the pertinent performance standards are provided below, along with a description of how the project meets these standards.

### 7.1 Redevelopment within Previously Developed Riverfront Area

The *Act Regulations* at 310 CMR 10.58 (5) provide performance standards for work within 'Previously Developed' Riverfront Area. Below are citations of the pertinent performance standards and an explanation of the project's compliance with the performance standards.

Redevelopment Within Previously Developed Riverfront Areas: Restoration and Mitigation. Notwithstanding the provisions of 310 CMR 10.58 (4) (c) and (d), the issuing authority may allow work to redevelop a previously developed riverfront area, provided the proposed work improves existing conditions. Redevelopment means replacement, rehabilitation, or expansion of existing structures...A previously developed riverfront area contains areas degraded prior to August 7, 1996 by impervious surfaces from existing structures or pavement, absence of topsoil... Work to redevelop previously developed riverfront area shall conform to the following criteria:

(a) At a minimum, proposed work shall result in an improvement over existing conditions of the capacity of the riverfront area to protect the interests identified in M.G.L. c. 131, s. 40. When a lot is previously developed but no portion of the riverfront area is degraded, the requirements of 310 CMR 10.58 (4) shall be met.

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- The project results in an improvement to the Riverfront Area by providing stormwater management and native restoration/enhancement plantings that will improve the capacity of the Riverfront Area to protect the interests of the *Act*.
- (b) Stormwater management is provided according to standards established by the Department.
  - The DEP does not require stormwater management for single-family dwelling construction. However, the Applicants propose to install gravel trench drains to capture runoff from the existing and proposed roof areas.
- (c) Within 200-foot riverfront areas, proposed work shall not be located closer to the river than existing conditions or 100 feet, whichever is less....
  - While the proposed addition will measure roughly 16 feet closer to Mill Brook compared to the existing dwelling, the proposed addition will be more than 100 feet from the Bank-MAHW Line.
- (d) Proposed work, including expansion of structures, shall be located outside the riverfront area or toward the riverfront area boundary and away from the river, except in accordance with 310 CMR 10.58 (5) (f) or (g).
  - While the proposed addition will measure roughly 16 feet closer to Mill Brook compared to the existing dwelling, Riverfront Area restoration/enhancement in accordance with 310 CMR 10.58 (5) (g) is proposed as further detailed below.
- (e) The area of proposed work shall not exceed the amount of the degraded area, provided that the proposed work may alter up to 10% if the degraded area is less than 10% of the riverfront area, except in accordance with 310 CMR 10.58 (5) (f) or (g).
  - Virtually the entire parcel is considered "Previously Developed" Riverfront Area, and roughly 1,556± square feet are considered "Degraded." The Applicants propose to increase the "Degraded" Riverfront Area footprint by roughly 363± square feet. This will be mitigated by restoring existing lawn and enhancing largely unvegetated land (735 square feet total) located within the Riverfront Area in accordance with 310 CMR 10.58 (5) (g) as detailed below.
  - (f) When an Applicant proposes restoration on-site of degraded riverfront area, alteration may be allowed notwithstanding the criteria of 310 CMR 10.58(5)(c), (d), and (e) at a ratio in square feet of at least 1:1 of restored area to area of alteration

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not conforming to the criteria. Areas immediately along the river shall be selected for restoration. Alteration not conforming to the criteria shall begin at the riverfront area boundary...

No Degraded Riverfront Area is available on the site for 1:1 restoration in accordance with 10.58 (5) (g).

(g) When an Applicant proposes mitigation either on-site or in the riverfront area within the same general area of the river basin, alteration may be allowed notwithstanding the criteria of 310 CMR 10.58(5)(c), (d), or (e) at a ratio in square feet of at least 2:1 of mitigation area to area of alteration not conforming to the criteria or an equivalent level of environmental protection where square footage is not a relevant measure...

The Applicants propose 735± square feet of Riverfront Area restoration/enhancement within the southern portion of the site, resulting in a 2:1 ratio of restoration/enhancement to the increase of Degraded Riverfront Area on the site. This restoration/enhancement effort, combined with the stormwater management efforts proposed herein, provide an 'equivalent level of environmental protection' relative to the proposed activities.

### 7.2 Bordering Land Subject to Flooding Performance Standards

The Act Regulations at 310 CMR 10.57 (4) state that work within BLSF shall conform to the following criteria:

- (a) Bordering Land Subject to Flooding
  - (1) Compensatory storage shall be provided for all flood storage volume that will be lost as a result of the proposed work.
    - While a portion of the trench drain (11± square feet) is proposed within BLSF, the trench drains will be installed at the existing grade. No displacement of flood storage volume is proposed as part of the project.
  - (2) Work within BLSF...shall not restrict flows so as to cause an increase in flood stage or velocity.
    - The proposed trench drain in the floodplain will not restrict flows or cause an increase in flood storage.

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(3) within BLSF shall not impair its capacity to provide important wildlife habitat functions.

According to the BLSF Preamble at 310 CMR 10.57 (1) (a) 3:

Certain portions of Bordering Land Subject to Flooding are also likely to be significant to the protection of wildlife habitat. These include all areas on the ten year floodplain or within 100 feet of the bank or bordering vegetated wetland (whichever is further from the water body or waterway, so long as such area is contained within the 100 year floodplain), and all vernal pool habitat on the 100 year floodplain, except for those portions of which have been so extensively altered by human activity that their important wildlife habitat functions have been effectively eliminated (such "altered" areas include paved and graveled areas, golf courses, cemeteries, playgrounds, landfills, fairgrounds, quarries, gravel pits, buildings, lawns, gardens, roadways (including median strips, areas enclosed within highway interchanges, shoulders, and embankments), railroad tracks (including ballast and embankments), and similar areas lawfully existing on November 1, 1987, and maintained as such since that time).

The portion of land located within BLSF is "altered" and is therefore not significant to the protection of wildlife habitat.

- (b) Protection of Rare Wildlife Species
  - (1) Notwithstanding the provisions of 310 CMR 10.57(4)(a) or (b), no project may be permitted which will have any adverse effect on specified wildlife habitat sites of rare vertebrate or invertebrate species.

There are no specified wildlife habitat sites of rare vertebrate or invertebrate species located on the project site; therefore, the proposed project will have no adverse effect on any such sites. Rather, implementing the *Planting Plan* will improve wildlife habitat value for the site by providing food and cover resources for birds, insects, and small mammals.

### 7.3 Bylaw Performance Standards for Work Within the Floodplain

Section 23 D. of the *Bylaw Regulations* states: *The Commission may permit activity on land subject to flooding provided it shall not result in the following:* 

(1) Flood damage due to filling which causes lateral displacement of water that would otherwise be confined within said area.

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- No filling of the floodplain is proposed.
- (2) Adverse effect on public and private water supply or groundwater supply, where said area is underlain by pervious material.
  - The project will not result in any increase in pollutants that could otherwise potentially result in an adverse effect on public or private water supply or groundwater supply.
- (3) An adverse effect on the capacity of said area to prevent pollution of the groundwater, where the area is underlain by pervious material which in turn is covered by a mat of organic peat and muck.
  - LEC did not observe any such conditions within or near the subject property.
- (4) A rise in the base flood elevation anywhere in the floodplain. This must be demonstrated through hydrologic and hydraulic analysis performed in accordance with standard engineering practice performed by a registered professional.
- (5) Reduction in the ability of the land to buffer more inland areas from flooding.

No rise in the base flood elevation will result from the proposed project.

The project will not reduce the ability of the land to buffer inland areas from flooding.

Section 24G of the Bylaw Regulations states: Any such activity shall provide compensatory flood storage for all flood storage volume that will be lost at each elevation. Compensatory flood storage shall be at a 2:1 ratio, minimum, for each unit volume of flood storage lost at each elevation. Compensatory flood storage shall mean a volume not previously used for flood storage, shall have an unrestricted hydraulic connection to the same waterway or water body, and, with respect to waterways, shall be provided within the same reach of the river, stream, or creek. Work within Bordering Land Subject to Flooding, including that work required to provide the above specified compensatory storage, shall not restrict flows that cause an increase in flood stage or velocity. No new parking areas or garages shall be used as compensatory flood storage.

The Applicant is not proposing to displace any floodplain on the site, and no compensatory flood storage is required or proposed.

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### 7.4 BLSF Climate Resiliency

The Bylaw Regulations (Section 23 H.) also state that the Applicants shall take into consideration the impacts of climate change on the activities proposed on land subject to flooding, especially in terms of the compensatory flood storage as a climate change resilience strategy.

Since no floodplain displacement is proposed, no compensatory flood storage is required or proposed.

### 7.5 **General Climate Resiliency**

The Bylaw Regulations (Section 32 C) states that: The Applicants shall, to the extent practicable and applicable as determined solely by the Commission, integrate considerations of adaptation planning into their project to promote climate change resilience so as to protect and promote resource area values into the future. These considerations are especially important in Land Subject to Flooding (floodplain) and Riverfront Area and other Resource Areas which protect the interest of Flood Control and Storm Damage Prevention, including Adjacent Upland Resource Areas. These Resource Areas may be directly impacted by extreme weather events expected to be more prevalent or more intense due to climate change, in surface runoff of pollutants, and in wildlife habitat due to changes in temperature.

Section 32E. states that: each project shall include at least the following measures to mitigate climate change impacts and adapt to changed climatic conditions. The Applicants shall address the following in writing in their application:

(1) Describe project design considerations and measures to limit storm and flood damage during extended periods of disruption and flooding as might be expected in extreme weather events, using the FEMA 500-year flood elevation to represent extreme weather event flood levels, depending on the size and nature of the project. Project design considerations may include but not be limited to stormwater mitigation measures sized for increased precipitation expected due to climate change, 2:1 compensatory flood storage replacement, and 2:1 or higher tree replacement/plantings, See Land Subject to Flooding Section 24, Vegetative Wetlands Section 25, Adjacent Upland Resource Area Section 26, and Stormwater Management Section 33 of these Regulations.

The Applicants propose to construct an addition that is entirely outside of the BLSF on the site, resulting in an insignificant change compared to existing conditions. In addition to capturing and infiltrating roof run-off from the proposed addition and a portion of the

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existing dwelling, the Applicants propose to capture the stormwater runoff from the existing garage that is partially situated within the floodplain, where no stormwater management is required. The Applicants also propose to restore/enhance 735± square feet of lawn and largely unvegetated land within the BLSF and Riverfront Area with native vegetation. The proposed mitigation measures are commensurate with the limited scope of the project, and provide an equivalent amount of environmental protection.

(2) Calculate project stormwater surface runoff that is expected to increase due to extreme weather events using NOAA 14 Plus Plus rainfall data (see definition in Section 4) and how this will be managed and mitigated to prevent pollution (including nutrients from fertilizers, roadway runoff, etc.) from entering the resource area in the future, with consideration of eliminating or decreasing impervious surfaces as much as feasible. Project design considerations may include but not be limited to stormwater mitigation measures sized for increased precipitation expected due to climate change. See Stormwater Management Section 33 of these Regulations.

The project results in a net increase of impervious surface of 316.6± square feet, which is below the 350-square-foot impervious increase threshold that triggers stormwater management under the *Bylaw* and *Bylaw Regulations*. As discussed in Section 6.2, the Applicants propose to construct two trench drains to provide stormwater runoff for the addition, a portion of the existing roof, and the entire detached garage to mitigate for the project and provide a commensurate level of climate resiliency.

(3) Describe project vegetation/planting plans and any other measures to improve the resiliency of the resource areas to provide resource area values including but not limited to wildlife habitat; that is, to enable resource areas to withstand extreme precipitation/rainfall changes (drought and excess) and extreme temperatures including extreme heat due to climate change. Project design considerations may include but not be limited to diversity and abundance of replacement plantings and consideration of shading and cooling. See Vegetation Removal and Replacement Section 25 of these Regulations.

The Applicants will implement the *Planting Plan*, which specifies many native and landscape plants for the property. This effort will improve wildlife habitat for pollinator species and increase the vegetated land adjacent to Mill Brook.

(4) Describe project considerations and measures to avoid, minimize, and mitigate for extreme heat effects in resource areas. Project design considerations may include but not



be limited to reducing impervious surfaces, increasing or maintaining naturally vegetated surfaces, increasing tree canopy, consideration of shading of structures.

As discussed above, the Applicants propose to increase the amount of naturally vegetated surfaces by implementing a restoration/enhancement plan, including the installation of 9 sapling trees, 16 shrubs, and hundreds of groundcover plants. Over time, the sapling trees will provide shade to mitigate heat effects.

(5) Describe any additional measures to avoid, minimize, and mitigate for climate change impacts and adapt to changed climatic conditions that are in addition to (1) through (4) above.

No additional climate resiliency measures are proposed beyond those described above.

### 8. Summary

On behalf of the Applicants and Property Owners, Linnea and David Berggren, LEC is filing the enclosed NOI Application with the Arlington Conservation Commission to construct an addition, renovate a front porch, and conduct hardscaping and landscaping activities at 2 Reservoir Road in Arlington. The proposed activities are located within Riverfront Area, Bordering Land Subject to Flooding associated with Mill Brook, and within the 100-foot Buffer Zone to Bordering Vegetated Wetlands, as jurisdictional under the *Act*, its implementing *Regulations*, and the *Bylaw* and *Bylaw Regulations*.

The Applicants propose to implement mitigation measures, including erosion controls to protect the adjacent properties and resource areas during construction, and stormwater management and Riverfront Area restoration/enhancement to improve existing site conditions and promote climate resiliency. The project, including the proposed mitigating measures, meets the performance standards enumerated in the *Act Regulations*, and the *Bylaw Regulations*, and the Applicants request that the Commission issue an Order of Conditions approving the project as proposed herein.

EAST PROVIDENCE, RI



PLYMOUTH, MA

WAKEFIELD, MA

Arlington Conservation Commission, *Town of Arlington Wetlands Protection Bylaw* (Article 8) Town of Arlington, Massachusetts.

Massachusetts Department of Environmental Protection, Division of Wetlands and Waterways *Massachusetts Handbook for Delineation of Bordering Vegetated Wetlands* (Second Edition, September 2022)

Massachusetts Natural Heritage and Endangered Species Program Atlas of Estimated Habitat of State-listed Rare Wetlands Wildlife, Natural Heritage & Endangered Species Program, Massachusetts Division of Fisheries & Wildlife, Route 135, Westborough, MA 01581, www.state.ma.us/dfwele/dfw

Massachusetts Wetlands Protection Act (M.G.L. c. 131, §. 40), <a href="www.state.ma.us/dep">www.state.ma.us/dep</a> Massachusetts Wetlands Protection Act Regulations (310 CMR 10.00), <a href="www.state.ma.us/dep">www.state.ma.us/dep</a>

National Flood Insurance Program, Federal Emergency Management Agency Flood Insurance Rate Map (Map Number 25017C0416E), Middlesex County, June 4, 2010.

New England Hydric Soils Technical Committee. 2020, 4<sup>th</sup> ed., *Field Indicators for Identifying Hydric Soils in New England*.

The State of Massachusetts 2016 Wetland Plant List (Lichvar, R.W, et al. 2016). US Army Corps of Engineers

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RINDGE, NH

WORCESTER, MA

### Appendix A

Locus Maps

Figure 1: USGS Topographic Quadrangle

Figure 2: FEMA Flood Insurance Rate Map

Figure 3: MassGIS Orthophoto & NHESP Estimated Habitat Map

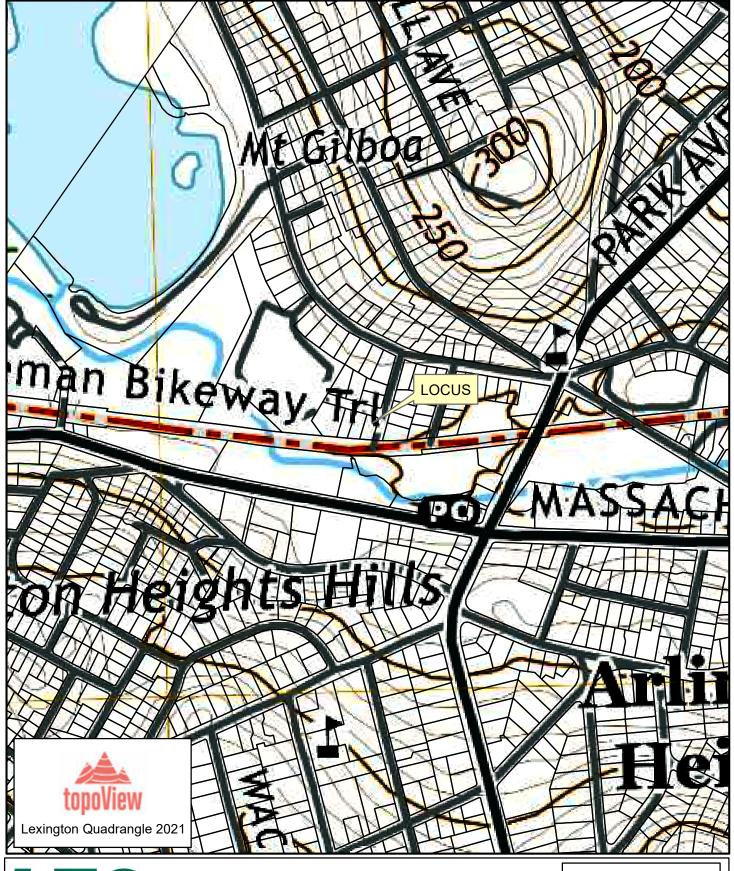
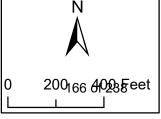




Figure 1: USGS Topographic Map 2 Reservoir Road Arlington, MA

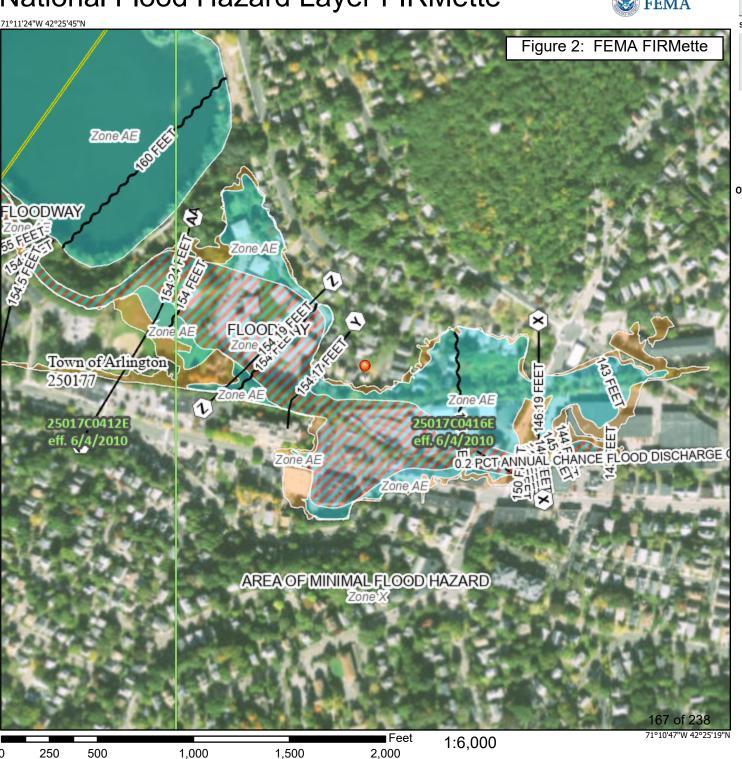
February 21, 2024



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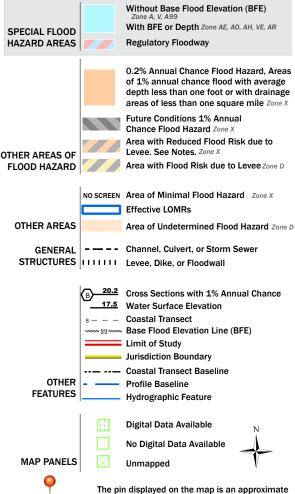
## National Flood Hazard Layer FIRMette





### Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT



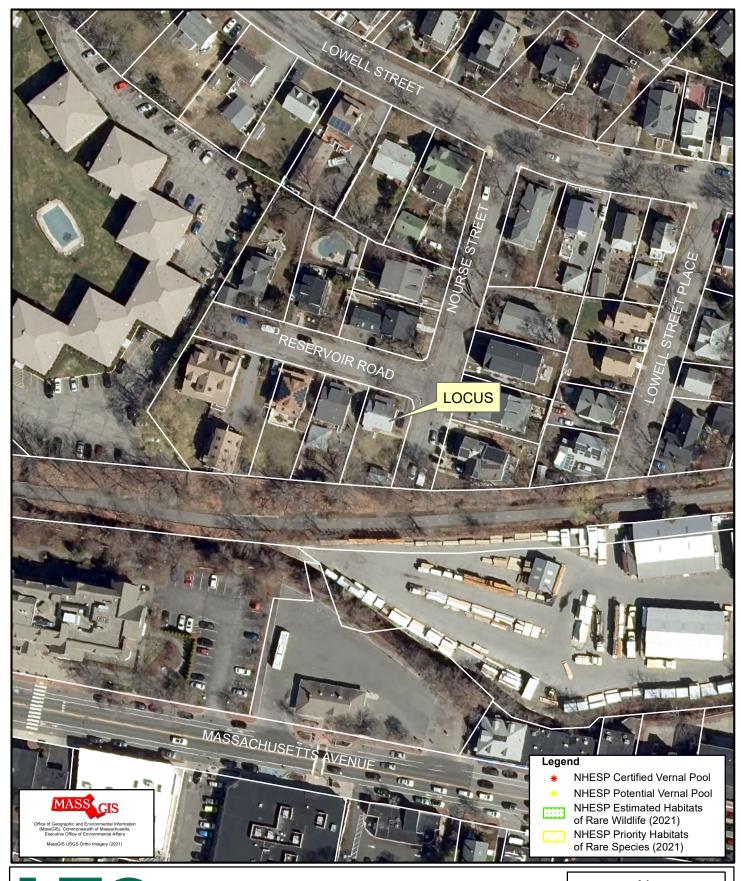
This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

point selected by the user and does not represent

an authoritative property location.

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 12/4/2023 at 1:33 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

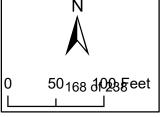




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Figure 3: MassGIS Orthophoto & NHESP Map 2 Reservoir Road Arlington, MA

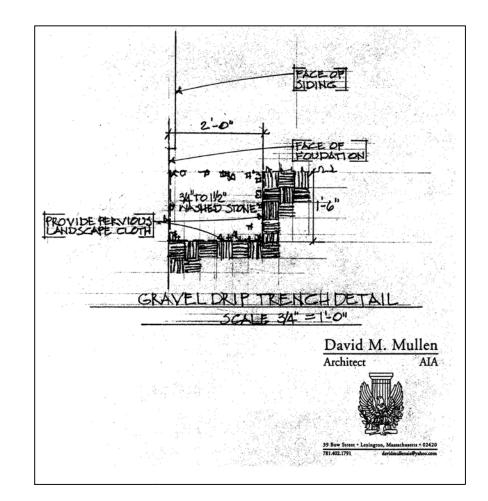
February 21, 2024



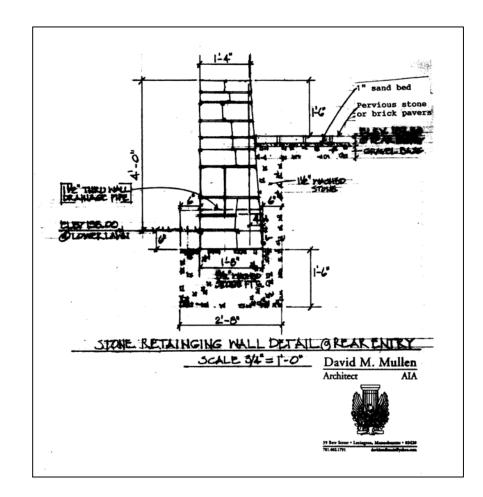
### Appendix B

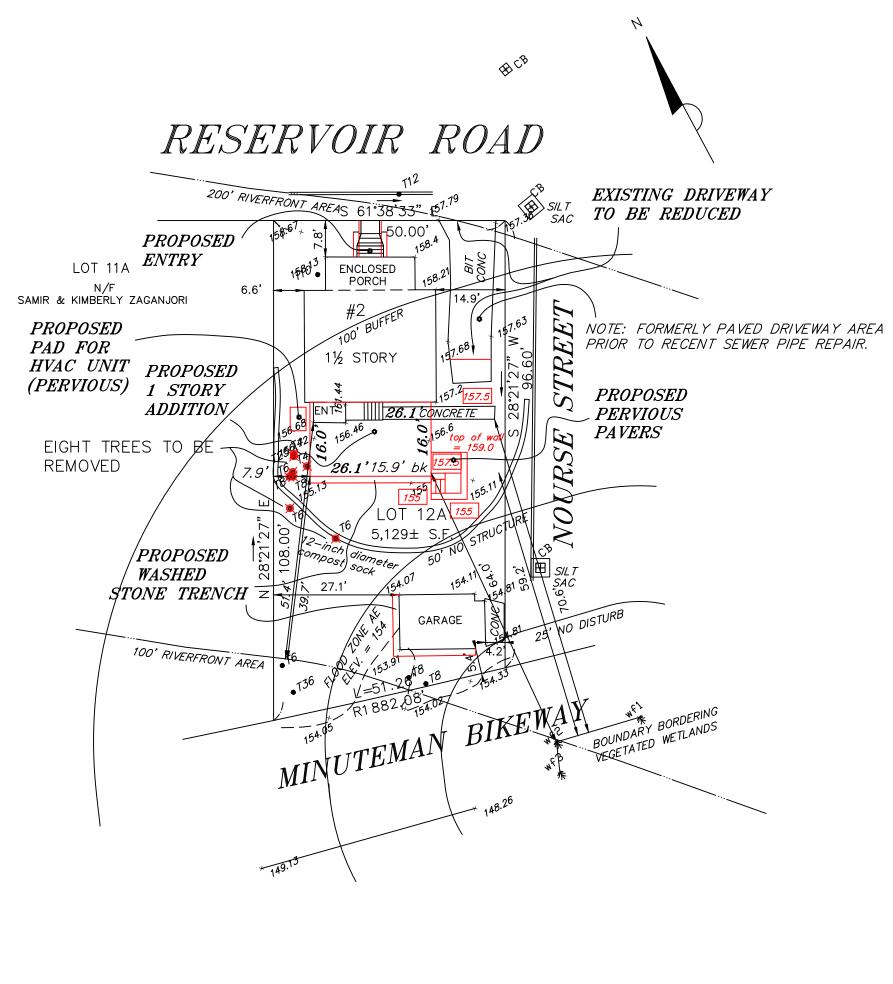
Conservation Plan, dated January 4, 2024, prepared by Rober Survey

# WASHED STONE TRENCH DETAIL NOT TO SCALE



STONE RETAINING WALL DETAIL NOT TO SCALE





CONCRETE RETAINING WALL

WITHIN 100' BUFFER

TOTAL BUFFER AREA 4,097± S.F. EXISTING IMPERVIOUS AREA 1,074± S.F. 26.2% PROPOSED IMPERVIOUS AREA 1,372.1± S.F. 33.5%

WITHIN 100' RIVERFRONT

TOTAL BUFFER AREA 221± S.F.

EXISTING DEGRADED AREA 0± S.F. 000

PROPOSED DEGRADED AREA 0± S.F. 0000

Output

Description:

WITHIN 100'-200' RIVERFRONT

TOTAL BUFFER AREA 4,884± S.F. EXISTING DEGRADED AREA 1,556± S.F. 31.8% PROPOSED DEGRADED AREA 1,918.9± S.F. 39.2%

TOTAL RIVERFRONT AREA

TOTAL BUFFER AREA 5,105± S.F.
EXISTING DEGRADED AREA 1,556± S.F. 30.4%
PROPOSED DEGRADED AREA 1,918.9± S.F. 37.5%

PROPOSED ADDITION AREAS

REAR ADDITION
ENTRY WAY

EXISTING IMPERVIOUS DRIVEWAY
REDUCED IMPERVIOUS DRIVEWAY
PROPOSED WALL AND STAIRS

418± S.F.
50± S.F.
50± S.F.

NOTE: AREA OF TRENCH DRAIN LOCATED WITHIN ZONE AE =  $11\pm$  S.F.

155 – PROPOSED ELEVATION

PREPARED FOR: DAVID BERGGREN

CONSERVATION PLAN

ARLINGTON, MA (MIDDLESEX COUNTY)

SCALE: 1"= 20' DATE: JANUARY 4, 2024

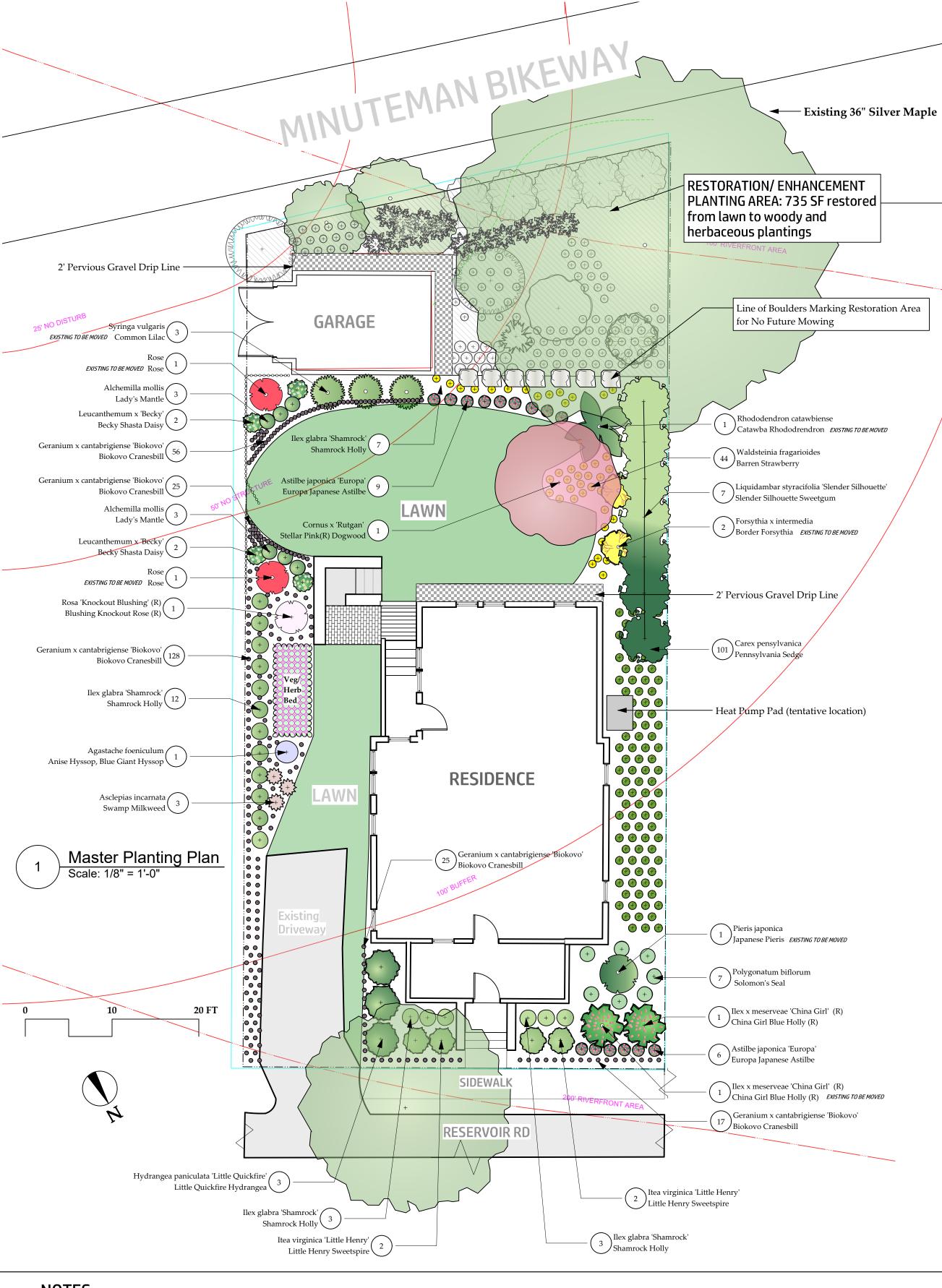


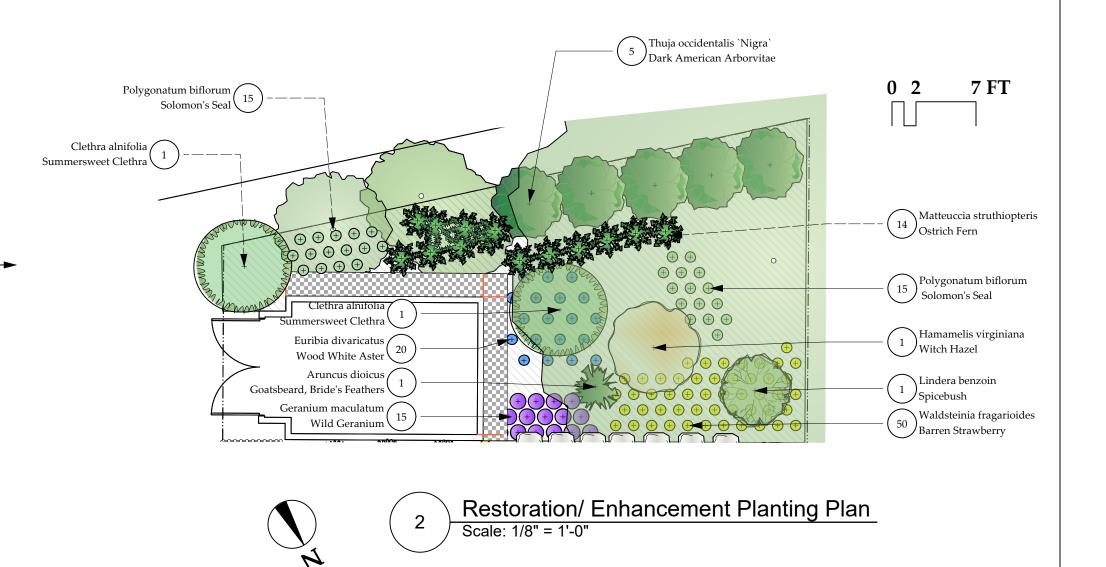
10/2A MASSACHUSETTS AVENUE ARLINGTON, MA 02476 (781) 648-5533 5213PP6.DWG

NOTE: WETLAND BOUNDARY LINE DELINEATED BY LEC ENVIRONMENTAL, DECEMBER 13, 2023.

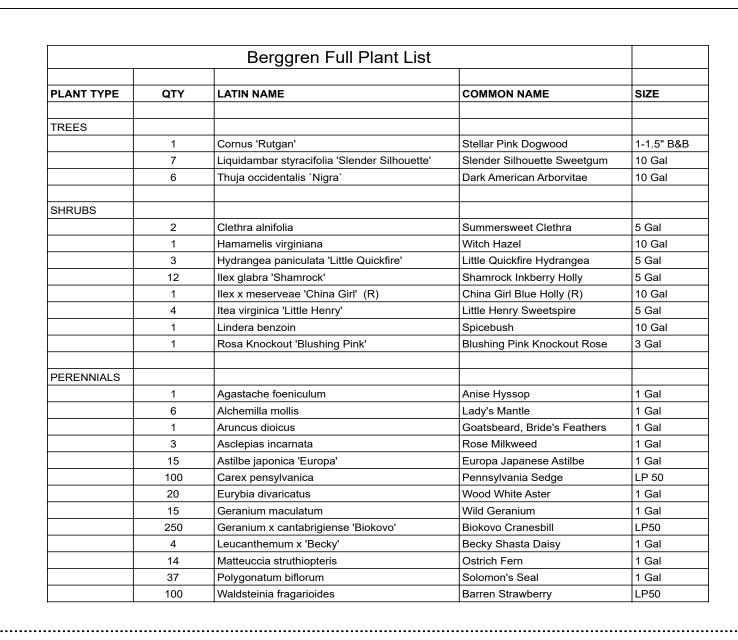
### Appendix C

Planting Plan, dated January 20, 2024 and revised February 20, 2024, prepared by Holly Garden Design

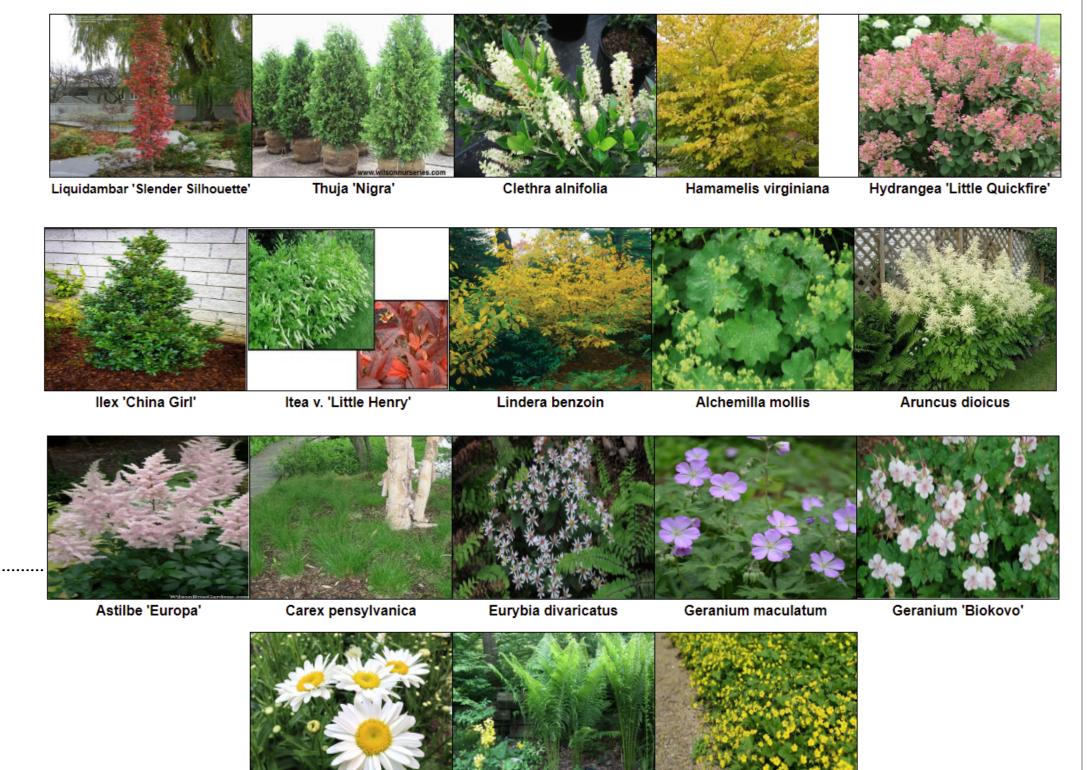




Berggren Restoration Plant List				
PLANT TYPE	QTY	LATIN NAME	COMMON NAME	SIZE
TDEEC				
TREES	5	Thuja occidentalis `Nigra`	Dark American Arborvitae	10 Gal
SHRUBS				
	2	Clethra alnifolia	Summersweet Clethra	5 Gal
	1	Hamamelis virginiana	Witch Hazel	10 Gal
	1	Lindera benzoin	Spicebush	10 Gal
PERENNIALS				
	1	Aruncus dioicus	Goatsbeard, Bride's Feathers	1 Gal
	20	Eurybia divaricatus	Wood White Aster	1 Gal
	15	Geranium maculatum	Wild Geranium	1 Gal
	14	Matteuccia struthiopteris	Ostrich Fern	1 Gal
	37	Polygonatum biflorum	Solomon's Seal	1 Gal
	50	Waldsteinia fragarioides	Barren Strawberry	LP50

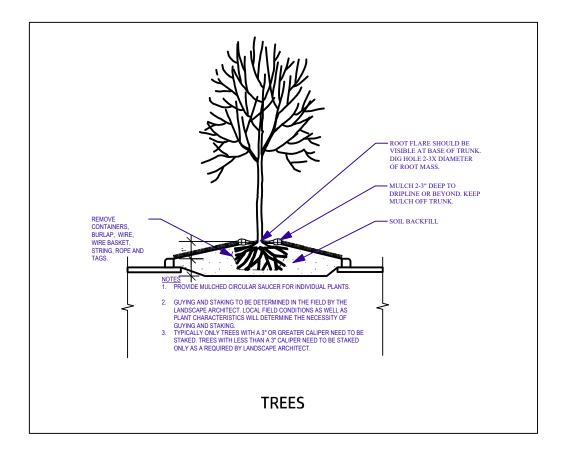


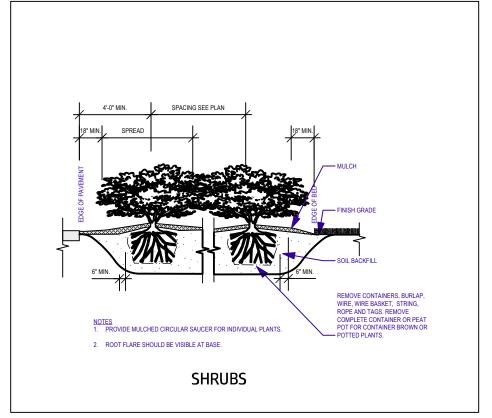
Tree Repla	cement Schedule			1	
TO BE REMOVED*			TO BE ADDED		
Qty	Common Name	Botanical Name	Qty	Common Name	Botanical Name
7	Norway Maple	Acer platanoides	7	Slender Silhouette Sweetgum	Liquidambar styracifolia 'Slender Sihouette'
1	Black Walnut	Juglans nigra	1	Stellar Pink Dogwood	Cornus 'Rutgan'

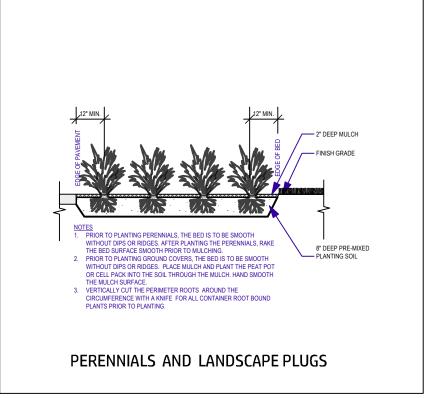


Matteuccia struthiopteris

# PLANTING DETAILS







Leucanthemum x 'Becky'

## NOTES

- 1) No plant substitutions without permission of Landscape Designer.
- 2) Landscape Designer to place plants on site.
- 3) Existing plants to be moved to be stored under layer of soil or bark mulch in the shade and kept moist until replanting.

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- 4) LP50 Landscape Plugs to be purchased from New Moon Nursery www.newmoonnursery.com
- If LP50 size unavailable, size substitutions to be approved by Landscape Designer.

Arlington, MA 02474

5) Restoration area to be covered with 3 inches of leaf mulch and future leaf fall to be kept in place.

Berggren Residence 2 Reservoir Rd.

Issue Date: 1.20.2024

Revisions: 1.24.2024 1.30.2024 2.13.2024 1.25.2024 2.8.2024 2.20.2024

1.26.2024 2.9.2024

Holly Samuels, Certified Landscape Designer Hollygardendesign@gmail.com 339-223-5923



### Town of Arlington, Massachusetts

### DEP #091-0356: Notice of Intent: Thorndike Place (Continuation from 2/15/2024).

#### Summary:

DEP #091-0356: Notice of Intent: Thorndike Place (Continuation from 2/15/2024).

The Conservation Commission will hold a public hearing under the Wetlands Protection Act to consider a Notice of Intent for the construction of Thorndike Place, a multifamily development on Dorothy Road in Arlington. This hearing will be limited to discussion regarding the peer review of the restoration plan.

#### ATTACHMENTS:

	Туре	File Name	Description
ם	Reference Material	2024-01-07_Response_to_Landscape_Restoration_Peer_Review_(1).pdf	2024-01-07 Response to Landscape Restoration Peer Review (1).pdf
ם	Reference Material	2024-02-28_Response_to_Stormwater_Comments.pdf	2024-02-28 Response to Stormwater Comments.pdf
ם	Reference Material	BETA_ReviewFlood_Mitigation_(00284590xBC4F6).pdf	BETA ReviewFlood Mitigation (00284590xBC4F6).pdf
ם	Reference Material	SWCA_85770_Thorndike_Place_NOI_Peer_Review.pdf	SWCA_85770_Thorndike Place NOI Peer Review.pdf
ם	Reference Material	SWCA_85770_Thorndike_Place_NOI_Peer_Review_Response_to_Applicant_Comments_Letter.pdf	SWCA_85770_Thorndike Place NOI Peer Review_Response to Applicant Comments Letter.pdf
D	Reference Material	Thorndike_Place_Building_Memo_Update_022824.pdf	Thorndike Place Building Memo Update 022824.pdf
ם	Reference Material	Thorndike_Place_Flooding_Memo_Hession_(00284589xBC4F6).pdf	Thorndike Place Flooding Memo_Hession (00284589xBC4F6).pdf
ם	Reference Material	CLeich_Monitoring_Wells_Approval.pdf	C. Leich Monitoring Wells Approval.pdf



Engineers
Environmental Scientists
Software Developers
Landscape Architects
Planners
Surveyors

**FEBRUARY 7, 2024** 

www.bscgroup.com

Town of Arlington Conservation Commission c/o Mr. Ryan Clapp, Conservation Administrator Robbins Memorial Town Hall 730 Massachusetts Avenue Arlington, Massachusetts 02476

RE: Response to Peer Review Comments
SWCA Environmental Consultants, Restoration Plan Peer Review
Thorndike Place, Arlington, Massachusetts

Dear Members of the Arlington Conservation Commission,

On behalf of the Applicant, Arlington Land Realty, LLC, BSC Group, Inc. (BSC) is pleased to submit this response to peer review comments provided by SWCA Environmental Consultants (SWCA) relative to the Thorndike Place residential development (the Project) to be located off of Dorothy Road in the Town of Arlington. SWCA has performed a peer review of the Project's proposed restoration plan design on behalf of the Arlington Conservation Commission and issued comments in a memorandum dated January 23, 2024, titled *Notice of Intent Restoration Plan Peer Review, Thorndike Place, Arlington, Massachusetts*. For clarity, we have repeated the original comments from SWCA's peer review letter in standard text below utilizing the same numbering system and provided a summary of our response in *italics*.

<u>SWCA Comment 1</u>: Section 3.1.1, second paragraph. The narrative states that dead trees (i.e., snags) that do not provide wildlife habitat will be cut and stumped. Snags provide a wide variety of valuable wildlife habitat functions including shelter and forage opportunities. It is doubtful there are any snags that do not provide any wildlife habitat functions. Additionally, removal of snags does not appear to provide any ecological benefit and stumping of snags within the restoration area would likely result in unnecessary additional impacts (e.g., soil disturbance).

SWCA recommends that this language be revised to indicate that only snags that pose a hazard (e.g., leaning towards the proposed buildings and likely to result in property damage or injury) be removed and that no stumping will occur. SWCA recommends the Commission also consider a condition in the Order of Conditions (OOC), if issued, stating that any snags to be removed shall be approved by the Commission.

BSC Response 1: BSC concurs with the recommended revision and suggests a Special Condition allowing removal of snags from the proposed restoration area that pose a hazard (e.g., leaning toward buildings and/or likely to result in property damage or personal injury) and that no stumping of removed snags shall be permitted. We additionally recommend that the Special Condition allow for a representative of the Commission be authorized to coordinate, review, and approve any snag removal on behalf of the Commission to avoid construction delays.

<u>SWCA Comment 2</u>: Section 3.1.1, second paragraph. The narrative states that an Invasive Species Management Plan (ISMP) for work within resource areas and their buffer zones shall be developed as required by the Comprehensive Permit. During the site walk on January 5, representatives from BSC indicated that invasive species control would be included as part of the proposed restoration efforts. It is unclear how invasive species would be controlled (e.g., mechanical removal, chemical control, etc.) or what the target species would be.



SWCA recommends the Applicant develop a detailed ISMP to be included as part of the NOI that details what the target invasive species will be, proposed specific control methodologies, a monitoring plan to measure invasive vegetation control success, and performance goals. SWCA recommends the ISMP be reviewed by an expert in invasive species removal as some species (e.g., Japanese knotweed [Reynoutria japonica]) can be extremely challenging to effectively control.

<u>BSC Response 2:</u> Several invasive plant species occur on the Site, most notably Japanese knotweed, Oriental Bittersweet, and Garlic Mustard. These occur within jurisdictional resource areas and buffer zones, as well as within non-jurisdictional areas of the site.

BSC and the Applicant will prepare an Invasive Species Management Plan (ISMP) to treat invasive plants currently within the proposed wetland restoration area and to control their spread within the restoration area. BSC recommends that approval of such ISMP by the Conservation Commission's representative prior to the start of work be made a Special Condition of an Order of Conditions for the Project.

<u>SWCA Comment 3:</u> Section 3.1.1. The narrative includes multiple references to refuse that has been dumped on the site over the years. During the site walk on January 5, it was noted that as part of the proposed restoration work, the refuse would be removed as much as practicable.

SWCA recommends the Commission include a condition in the OOC, if issued, that requires all surficial refuse, including discarded clothing, metal, concrete rubble, lumber, plastic, and other similar garbage, to be removed from within the resource areas and their associated buffer zones within the limit of work. SWCA also recommends the Commission indicate that any refuse at the surface and partially buried be removed to a depth of up to 12 inches below ground (e.g., a shopping cart that has become partially buried in the soil).

<u>BSC Response 3:</u> BSC concurs with SWCA Comment 3 and agrees such a Condition be included as part of the OOC.

<u>SWCA Comment 4:</u> Section 3.1.1. The narrative provides a brief discussion of the proposed restoration activities, specifically restoration plantings. However, successful habitat restorations consider a wide variety of considerations, beyond vegetation. More specifically, the wildlife habitat and vegetation evaluation provided in Attachment G of the NOI identifies numerous wildlife habitat features including large woody debris, snags, hard mast and berry producing forage, rocks and rock piles, and others.

SWCA recommends the restoration plan consider how to improve important wildlife habitat functions within the restoration area and include methods to provide important wildlife habitat features that may be lost due to proposed impacts elsewhere on site.

<u>BSC Response 4:</u> The Restoration Plan has been updated to include proposed placement of coarse woody debris and stones and a few stone piles using natural materials originating from within the Limit of Work on the Project site. The Restoration Plan maximizes the use of native berry and mast producing vegetation to benefit wildlife habitat values of the restoration area. See Appendix for details of wildlife habitat features.

<u>SWCA Comment 5:</u> Section 3.1.1. The narrative and the wildlife habitat and vegetation evaluation identify numerous native and non-native trees and shrubs within the project limit of work, including the restoration area. However, out of the 17 proposed trees and shrubs to be planted, only two (red maple [*Acer rubrum*] and American hornbeam [*Carpinus carolineana*]) are included on the plant schedule.

SWCA recommends the restoration plan be revised to include species within the restoration area that occur onsite to better represent the diversity and community structure of adjacent habitats. There are numerous trees and shrubs documented in the NOI application materials that would be suitable for the restoration area including American elm (Ulmus americana), black cherry (Prunus serotina), yellow birch (Betula allegheniensis), sweet birch (Betula lenta), box elder (Acer negundo), silver maple (Acer saccharinum), white pine (Pinus strobus), sycamore (Platanus occidentalis), black willow (Salix nigra), and others that are also typically readily available as nursery stock.



<u>BSC Response 5:</u> BSC concurs with SWCA Comment 5 and has updated the proposed planting plan and shown approximate locations of wildlife habitats.

SWCA Comment 6: Sheet G-101, Planting Notes, Note 11. The site plans indicate that the plant species indicated on the plant list are recommendations only and that final selection of the species shall occur at the time of plant purchase, depending on availability and that the size and quantity shall not change without approval of the Applicant's landscape architect.

SWCA recommends this note be revised to indicate that the proposed planting species, sizes, and quantities may be subject to change based on availability. However, these changes should be approved by the Conservation Commission and should be approved prior to purchase.

<u>BSC Response 6:</u> BSC has made the recommended revision to the Sheet G-101 Planting Notes, Note 11. We recommend that the Order of Conditions allow administrative approval of such availability-based changes by the Conservation Commission or its authorized representative to prevent undue construction delays in making such substitutions if necessary.

<u>SWCA Comment 7:</u> Sheet G-101, Comprehensive Permit Notes, Comment I.5. This comment notes that dumping of woody vegetation, brush, and other debris in a resource area or its associated buffer zone is prohibited.

SWCA notes that an exception to this requirement might be considered for the restoration area as large woody debris, brush piles, and other similar wildlife habitat features provide quality habitat functions and are likely to increase the ecological value of the restored habitats.

BSC Response 7: Sheet G-101, Comprehensive Permit Notes, Comment 1.5 is a Condition of the Comprehensive Permit, and the wording is copied directly from that Condition. The intent of the Condition is to prohibit the dumping of materials removed during construction in the wetlands or buffer zone. In accordance with BSC Response 4 above, the Restoration Plan will be updated with detailed natural coarse woody debris and stone wildlife habitat features using materials originating from the site, but material removed from the site during construction will not be disposed of within resource areas or associated buffer zones in accordance with the Comprehensive Permit condition.

<u>SWCA Comment 8:</u> Sheet G-101, Comprehensive Permit Notes, Comment I.25. The site plans note that the survival rate of planted species shall be 80% at the end of the third year and that a corrective action plan must be submitted if the survival rate is less than 80% at the end of the third year.

SWCA recommends the Commission consider requiring a corrective action plan to be developed by the Applicant if the 80% success rate is not met after any year of monitoring. Waiting until the third year of monitoring to develop and implement any corrective actions may unnecessarily prolong reaching the project's performance goals and may result in unnecessary disturbance to the area to rectify any adverse conditions since the restoration area will have had three years to establish.

<u>BSC Response 8:</u> Sheet G-101, Comprehensive Permit Notes, Comment I.25 is a condition of the Comprehensive Permit, and the wording is copied directly from that Condition. The Comprehensive Permit Condition was prepared upon the recommended conditions submitted to the Zoning Board by the Conservation Commission by letter dated October 14, 2021.

SWCA Comment 9: Sheet L-100, Plant Schedule. The plant schedule includes a number of proposed cultivars within the 100-foot Buffer Zone (e.g., Clethra alnifolia 'ruby spice', Hydrangea quercifolia 'ruby slippers', and Hydrangea arborescens 'annabelle'). In accordance with condition I.24 of the Comprehensive Permit, all mitigation plantings and plantings within all resource areas shall be native, non-cultivar species. Additionally, other cultivars are proposed in other areas of the site along side non cultivars of native species (e.g., pin oak [Quercus palustris] and green pillar pin oak [Q. palustris 'pringreen']).

SWCA recommends the planting plan be revised to not include any cultivars.



<u>BSC Response 9:</u> BSC concurs with SWCA Comment 9 and has revised the planting plan to not include cultivars within the 100-foot buffer.

<u>SWCA Comment 10:</u> Sheet L-100. A note on the plans indicates that all dead trees (i.e., snags) that do not provide wildlife habitat per the landscape architect and wildlife ecologist should be removed. Snags provide a wide variety of valuable habitat functions for wildlife including forage for insects, perches to hunt from, shelter if there are cavities or cracks, and other functions.

SWCA recommends this note be revised to indicate that only snags that pose a hazard (e.g., may fall and land on the buildings) may be removed and that removal of any snags must be approved by the Commission.

BSC Response 10: BSC concurs with SWCA Comment 10 and has revised Sheet L-100 according to SWCA's Comments 1 and 10.

We look forward to discussing this project with you further at the upcoming public hearings on the project. Please feel free to contact me at (617) 896-4386 or drinaldi@bscgroup.com should you have any questions on the information in this report.

Sincerely,

BSC GROUP, INC.

Dominic Rinaldi, PE

Senior Associate

Attachments: Revised General Notes and Legend

Revised Planting Plan Habitat Details

### GENERAL NOTES

- EXISTING CONDITIONS SURVEY INFORMATION WAS PREPARED BY BSC GROUP, INC. SURVEY IS BASED ON AN ON-THE-GROUND SURVEY CONDUCTED BY BSC GROUP IN DECEMBER 2019-FEBRUARY 2020.
- REVIEW ALL EXISTING CONDITIONS IN THE FIELD AND REPORT ANY DISCREPANCIES BETWEEN PLANS AND ACTUAL CONDITIONS TO THE OWNER'S REPRESENTATIVE IN WRITING PRIOR TO STARTING WORK.
- THE LOCATIONS OF UNDERGROUND UTILITIES SHOWN ON THIS PLAN ARE BASED ON THE SURVEY REFERENCED ABOVE. THE CONTRACTOR SHALL CONTACT DIGSAFE (888–344–7233 OR 811) AND THE PROPER LOCAL AUTHORITIES OR RESPECTIVE UTILITY COMPANIES TO CONFIRM THE LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. ANY DAMAGE DUE TO FAILURE OF THE CONTRACTOR TO CONTACT THE PROPER AUTHORITIES SHALL BE BORNE BY THE CONTRACTOR.
- ANY DISCREPANCIES BETWEEN DRAWINGS, SPECIFICATIONS, AND SITE CONDITIONS SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER IN WRITING FOR CLARIFICATION AND RESOLUTION PRIOR TO BIDDING OR CONSTRUCTION.

### SITE PREPARATION NOTES

- ONLY AREAS DESIGNATED FOR CLEARING SHALL BE CLEARED.
- THE SUBCONTRACTOR(S) IS/ARE RESPONSIBLE FOR ANY DAMAGE TO EXISTING CONDITIONS TO REMAIN THAT ARE DUE TO SUBCONTRACTOR(S) OPERATIONS.
- ITEMS TO BE REMOVED THAT ARE NOT STOCKPILED FOR LATER REUSE ON THE PROJECT OR DELIVERED TO THE OWNER SHALL BE LEGALLY DISPOSED OF OFF SITE BY THE SUBCONTRACTOR(S)
- THE SUBCONTRACTOR(S) SHALL BE RESPONSIBLE FOR COORDINATING THEIR EFFORTS WITH ALL TRADES.
- THE CONTRACTOR SHALL COORDINATE ALL ADJUSTMENT OR ABANDONMENT OF UTILITIES WITH THE RESPECTIVE UTILITY COMPANY.
- THE SUBCONTRACTOR(S) SHALL MAINTAIN OR ADJUST TO NEW FINISH GRADE AS NECESSARY ALL UTILITY AND SITE STRUCTURES SUCH AS LIGHT POLES, SIGN POLES, MAN HOLES, CATCH BASINS, HAND HOLES, WATER AND GAS GATES, HYDRANTS, ETC., FROM MAINTAINED UTILITY AND SITE SYSTEMS UNLESS OTHERWISE NOTED OR DIRECTED BY THE CONTRACTOR/ENGINEER.
- TEMPORARY CONSTRUCTION HAUL ROADS (IF REQUIRED) SHALL BE EXCAVATED AND THE SUB-BASE COMPACTED TO 95% SPMDD. THE USE OF SEPARATION FABRICS MAY BE USED TO FACILITATE FUTURE REMOVAL AND RECOVERY OF GRANULAR MATERIALS. HAUL ROAD SHALL HAVE AT LEAST 9" OF 6-INCH MINUS STONE AND SHALL BE MAINTAINED DURING CONSTRUCTION.

### EROSION AND SEDIMENT CONTROL MEASURES

- EROSION CONTROL SHALL BE PROVIDED IN ACCORDANCE WITH THE SEQUENCE OF STAGED CONSTRUCTION. THE CONTRACTOR SHALL SUBMIT A DETAILED EROSION CONTROL PLAN INCLUDING SCHEDULE FOR APPROVAL BY THE TOWN OF ARLINGTON. A COPY OF THE APPROVED NPDES — EROSION AND SEDIMENT CONTROL PLAN SHALL BE MAINTAINED ON THE SITE.
- ALL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO ANY SITE EXCAVATION OR DISTURBANCE AND SHALL BE MAINTAINED THROUGHOUT THE CONSTRUCTION PROCESS. THE SMALLEST PRACTICAL AREA OF LAND SHALL BE EXPOSED AT ANY ONE TIME.
- SEDIMENT TRAPS SHALL BE INSTALLED AT DRAINAGE STRUCTURES IN PUBLIC STREET IN THE PROJECT AREA. STRAW BALE BARRIERS AND SILTATION FENCES ARE TO BE MAINTAINED AND CLEANED UNTIL ALL SLOPES HAVE BEEN STABILIZED
- SEDIMENT BARRIERS SHALL BE INSPECTED AND APPROVED BY THE TOWN OF ARLINGTON BEFORE CONSTRUCTION CAN START.
- STRAW BALES AND MULCH SHALL BE MOWINGS OF ACCEPTABLE HERBACEOUS GROWTH, FREE OF NOXIOUS WEEDS OR WOODY STEMS, AND SHALL BE DRY WHEN INSTALLED.
- THE UNDERSIDE OF STRAW BALES SHOULD BE KEPT IN CLOSE CONTACT (TRENCHED IN 3-INCHES MINIMUM) WITH THE EARTH AND RESET AS NECESSARY.
- DISTURBED AREAS SHALL BE BLANKETED OR SEEDED AND MULCHED AS SOON AS PRACTICAL AFTER CONSTRUCTION ACTIVITIES IN THAT AREA HAVE CONCLUDED. ALL ERODABLE/BARE AREAS SHALL BE BLANKETED
- OR SEEDED AND MULCHED WITHIN 7 DAYS WITH TEMPORARY EROSION CONTROL SEEDING. STABILIZE SLOPES GREATER THAN 3:1 (HORIZONTAL:VERTICAL) WITH SEED, SECURED GEOTEXTILE FABRIC,
- SPRAYED COMPOST BLANKET, OR RIP-RAP AS REQUIRED TO PREVENT EROSION DURING CONSTRUCTION. SEDIMENT BARRIERS SHALL BE CONSTRUCTED AROUND ALL SOIL STOCKPILE AREAS.
- CLEAN OUT DRAINAGE FEATURES AND STRUCTURES AFTER COMPLETION OF CONSTRUCTION.
- BE DISPOSED OF OFF SITE ON A REGULAR BASIS. SEDIMENT SHALL BE REMOVED FROM EROSION CONTROL SYSTEMS WHEN THE HEIGHT OF THE SEDIMENT EXCEEDS ONE-HALF OF THE HEIGHT OF THE SEDIMENT CONTROL

11. SEDIMENT COLLECTED DURING CONSTRUCTION BY THE VARIOUS TEMPORARY EROSION CONTROL SYSTEMS SHALL

- 12. AFTER ALL DISTURBED AREAS HAVE BEEN STABILIZED, THE SUBCONTRACTOR(S) SHALL REMOVE ALL TEMPORARY EROSION CONTROL MEASURES AT THE CONTRACTOR/ENGINEER DIRECTION.
- 13. AFTER THE REMOVAL OF TEMPORARY EROSION CONTROL MEASURES, THE SUBCONTRACTOR(S) SHALL GRADE AND SEED AREA OF TEMPORARY EROSION CONTROL MEASURE.
- 14. DAMAGED OR DETERIORATED ITEMS WILL BE REPAIRED IMMEDIATELY AFTER IDENTIFICATION OR AS DIRECTED BY THE CONTRACTOR/ENGINEER.
- 15. THE CONTRACTOR'S SITE SUPERINTENDENT WILL BE RESPONSIBLE FOR DAILY INSPECTIONS, MAINTENANCE, AND REPAIR ACTIVITIES. THE CONTRACTOR SHALL INSPECT EROSION CONTROL MEASURES EVERY SEVEN (7) CALENDAR DAYS. DAMAGED AND INEFFECTIVE EROSION CONTROL MEASURES SHALL BE REPAIRED OR REPLACED WITHIN 48
- 16. PIPE OUTLETS (IF ANY) SHALL BE STABILIZED WITH STONE.
- 17. TEMPORARY SEEDING SHALL BE AT A RATE OF 45 LBS PER ACRE, ERODABLE AREAS OUTSIDE AND DOWN SLOPE FROM THE CONSTRUCTION LIMITS SHALL BE SIMILARLY SEEDED.
- 18. WATER PUMPED OR OTHERWISE DISCHARGED FROM THE SITE DURING CONSTRUCTION DEWATERING SHALL BE FILTERED. DEWATERING PLAN SHALL BE SUBMITTED FOR APPROVAL BY THE ENGINEER.
- 19. WHEN TEMPORARY DRAINAGE IS ESTABLISHED, EROSION/SEDIMENTATION CONTROL MEASURES MAY BE REQUIRED BY CONTRACTOR/ENGINEER.
- 20. GRAVEL CONSTRUCTION ROADS AND CONSTRUCTION PARKING AREAS OF SUFFICIENT WIDTH AND LENGTH, AND VEHICLE WASH DOWN FACILITIES, SHALL BE PROVIDED TO PREVENT SOIL FROM BEING TRACKED ONTO PUBLIC OR PRIVATE ROADWAYS. ANY SOIL REACHING A PUBLIC OR PRIVATE ROADWAY SHALL BE REMOVED BEFORE THE END OF EACH WORKDAY AND AS NEEDED.
- 21. NECESSARY MEASURES SHALL BE TAKEN TO CONTAIN ANY FUEL OR POLLUTION RUNOFF. LEAKING EQUIPMENT OR SUPPLIES SHALL BE IMMEDIATELY REPAIRED OR REMOVED FROM THE SITE.
- 22. THE COST OF REPAIRING OR REMOVING SEDIMENT FROM EROSION CONTROL SYSTEMS SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE FOR THE APPLICABLE EROSION CONTROL ITEM.
- 23. ALL EROSION CONTROL MEASURES SHALL BE KEPT OPERATIONAL AND MAINTAINED CONTINUOUSLY THROUGHOUT THE PERIOD OF LAND DISTURBANCE UNTIL PERMANENT SEDIMENT AND EROSION CONTROL MEASURES ARE OPERATIONAL. CONTRACTOR SHALL PROVIDE TO THE CONSERVATION COMMISSION MEASURES (EROSION AND SEDIMENTAITON CONTROL) FOR WORK DURING WINTER CONDITIONS.
- 24. CONTRACTOR SHALL SPRAY WATER FROM A WATER TRUCK ON DRY AND WINDY DAYS TO PREVENT DUST FROM FORMING.
- 25. EROSION CONTROL MEASURES AS SHOWN ON THESE DRAWINGS ARE INTENDED TO CONVEY MINIMUM REQUIREMENTS. THE CONTRACTOR SHALL IMPLEMENT ADDITIONAL MEASURES AS NECESSARY TO PREVENT SOIL EROSION AND TO COMPLY WITH THE PROJECT'S STORMWATER POLLUTION PREVENTION PLAN.
- 26. SOILS ON SLOPES THAT ARE 3:1 OR STEEPER SHOULD BE ROUGHENED PER THE EPA'S NPDES SOIL ROUGHENING FACT SHEET IF THEY ARE TO BE SEEDED WITHIN 2 WEEKS OF DISTURBANCE. IF NOT, EROSION CONTROL BLANKETS SHOULD BE INSTALLED ON THESE SLOPES.

### LAYOUT AND MATERIAL NOTES

OTHERWISE NOTED.

- THE FOLLOWING LAYOUT CRITERIA SHALL CONTROL UNLESS OTHERWISE NOTED ON THE PLAN: a. ALL TIES TO PROPERTY LINES ARE PERPENDICULAR TO THE PROPERTY LINE UNLESS
- b. DISTANCES AND DIMENSIONS ARE IN DECIMAL FEET.
- SCREENED IMAGES SHOW EXISTING CONDITIONS. WHERE EXISTING CONDITIONS LIE UNDER OR ARE IMPINGED UPON BY PROPOSED BUILDINGS AND/OR SITE ELEMENTS, THE EXISTING CONDITION SHALL BE REMOVED, ABANDONED AND/OR CAPPED OR DEMOLISHED AS REQUIRED. AMBIGUITIES IN THE PLANS SHALL BE CLARIFIED BY THE ENGINEER OR SITE SUPERINTENDENT UPON WRITTEN REQUEST FOR CLARIFICATION BY THE SUBCONTRACTOR.

### GRADING AND UTILITY NOTES

- THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE APPLICANT. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MAY BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ALL UNDERGROUND UTILITIES.
- 2. THE PROJECT APPLICANT SHALL OBTAIN ALL NECESSARY STREET-OPENING PERMITS, WATER AND SEWER CONNECTION PERMITS AND PAY REQUIRED FEES PRIOR TO COMMENCING WORK ON THESE
- 3. WHERE AN EXISTING UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, THE LOCATION, ELEVATION, AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY COORDINATION WITH THE TOWN OF ARLINGTON.
- ALL ARRANGEMENTS FOR THE ALTERATION AND ADJUSTMENT OF ALL GAS, ELECTRIC, TELEPHONE, AND ANY OTHER PRIVATE UTILITIES BY THE UTILITY COMPANIES SHALL BE MADE BY THE PROJECT
- AREAS OUTSIDE THE LIMITS OF PROPOSED WORK DISTURBED BY THE CONSTRUCTION SHALL BE RESTORED TO THEIR ORIGINAL CONDITION.
- WHERE PROPOSED GRADES MEET EXISTING GRADES, SUBCONTRACTOR(S) SHALL BLEND GRADES TO PROVIDE A SMOOTH TRANSITION BETWEEN EXISTING AND NEW WORK. PONDING AT TRANSITION AREAS WILL NOT BE ALLOWED.
- POSITIVE DRAINAGE SHALL BE MAINTAINED AWAY FROM ALL STRUCTURES.
- SUBCONTRACTOR(S) SHALL VERIFY EXISTING GRADES AND NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES.
- PRIOR TO ANY WORK OVER EXISTING TOWN-OWNED UTILITIES, CONTRACTOR TO EVALUATE CONDITION OF SUBSURFACE UTILITIES PRIOR TO CONSTRUCTION. A POST-CONSTRUCTION EVALUATION SHALL ALSO BE PERFORMED TO IDENTIFY ANY DAMAGE CAUSED DURING CONSTRUCTION.
- 10. ANY INSTALLATION OF UTILITY POLES OR UNDERGROUND CONDUIT WITHIN THE PUBLIC RIGHT-OF-WAY WILL REQUIRE A GRANT OF LOCATION FROM THE BOARD OF SELECTMEN.

### PLANTING NOTES

DIGGING.

- MAINTENANCE SHALL BEGIN IMMEDIATELY AFTER PLANTING AND SHALL CONTINUE UNTIL FINAL WRITTEN ACCEPTANCE OF PLANT MATERIAL
- MAINTAIN POSITIVE DRAINAGE AWAY FROM ALL BUILDING FOUNDATIONS AND STRUCTURES.
- MAXIMUM SLOPE WITHIN DISTURBED AREAS SHALL NOT EXCEED 3:1, UNLESS OTHERWISE NOTED.
- 4. THE LANDSCAPE CONTRACTOR SHALL SUPPLY ALL PLANT MATERIALS IN QUANTITIES SUFFICIENT TO COMPLETE PLANTINGS SHOWN ON THE DRAWINGS.
- MATERIALS SHALL CONFORM TO THE GUIDELINES ESTABLISHED BY THE AMERICAN NURSERY AND
- LANDSCAPE ASSOCIATION. PLANTS SHALL BEAR THE SAME RELATIONSHIP TO FINISH GRADE AS TO ORIGINAL GRADES BEFORE
- PLANTS SHALL BE BALLED IN BURLAP OR CONTAINERIZED
- AREAS PLANTED WITH EVERGREEN TREES SHALL BE COVERED WITH A MINIMUM 3" OF MULCH. MULCH FOR PLANTED AREAS TO BE AGED PINE BARK: PARTIALLY DECOMPOSED, DARK BROWN IN COLOR AND FREE OF WOOD CHIPS THICKER THAN 1/4 INCH.
- 9. THE LANDSCAPE CONTRACTOR SHALL GUARANTEE ALL PLANT MATERIALS FOR ONE (1) FULL YEAR FROM DATE OF ACCEPTANCE.
- 10. PLANT MATERIALS ARE SUBJECT TO THE APPROVAL OF THE LANDSCAPE ARCHITECT, AT THE NURSERY, AND AT THE SITE.
- 11. PLANT SPECIES AS INDICATED IN THE PLANT LIST ARE SUGGESTIONS ONLY. FINAL SELECTION OF SPECIES SHALL OCCUR AT THE TIME OF PLANT PURCHASE. DEPENDING ON AVAILABILITY. PLANT SIZE AND QUANTITY SHALL NOT CHANGE WITHOUT APPROVAL OF LANDSCAPE ARCHITECT. ANY CHANGES TO PLANT SPECIES SHALL BE REVIEWED AND APPROVED BY A REPRESENTATIVE OF THE ARLINGTON CONSERVATION COMMISSION PRIOR TO PURCHASE.

### COMPREHENSIVE PERMIT NOTES

CONTRACTOR REQUIRED TO ABIDE BY THE 'DECISION ON APPLICATION FOR COMPREHENSIVE PERMIT' ISSUED ON NOVEMBER 22, 2021 WITH SPECIFIC ATTENTION BROUGHT TO THE FOLLOWING CONDITIONS.

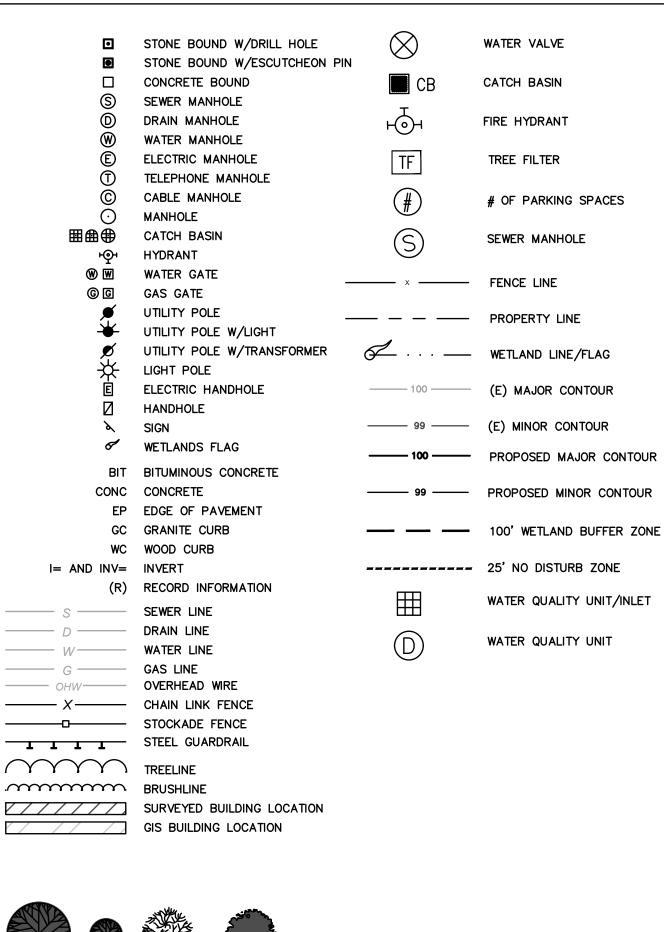
- D.15 BURNING OR BURIAL OF CONSTRUCTION OR DEMOLITION DEBRIS ON THE SITE IS STRICTLY PROHIBITED. ALL SUCH MATERIALS ARE TO BE REMOVED FROM THE SITE IN ACCORDANCE WITH APPLICABLE LAW. DURING CONSTRUCTION. THE SITE SHALL BE SECURED AGAINST UNAUTHORIZED ENTRY OR VANDALISM BY FENCING, OR OTHER APPROPRIATE MEANS, AND ALL CONSTRUCTION MATERIALS SHALL BE STORED OR STOCKPILED ON SITE IN A SAFE MANNER. ANY FLOODLIGHTS USED DURING THE CONSTRUCTION PERIOD SHALL BE LOCATED AND DIRECTED SO AS TO PREVENT SPILLOVER OR ILLUMINATION ONTO ADJACENT PROPERTIES. ALL CONSTRUCTION ACTIVITIES ARE TO BE CONDUCTED IN A WORKMANLIKE MANNER.
- D.16 NO BUILDING AREAS SHALL BE LEFT IN AN OPEN, UNSTABILIZED CONDITION LONGER THAN SIXTY (60) DAYS. TEMPORARY STABILIZATION SHALL BE ACCOMPANIED BY HAY BALES, HAY COVERINGS OR MATTING. FINAL STABILIZATION SHALL BE ACCOMPLISHED BY LOAMING AND SEEDING EXPOSED
- D.17 ALL DUMPSTERS SERVING THE PROJECT SHALL BE ENCLOSED AND COVERED (WITH THE EXCEPTION OF CONSTRUCTION DUMPSTERS USED DURING CONSTRUCTION). THE BOARD SHALL REVIEW THE DUMPSTER LOCATION AS PART OF THE APPROVAL OF THE FINAL PLANS IF DIFFERENT FROM WHAT HAS BEEN SHOWN ON THE APPROVED PLANS.
- H.2 ALL WATER AND SEWER INFRASTRUCTURE SHALL BE INSTALLED IN CONFORMANCE WITH THE ARLINGTON WATER AND SEWER DIVISION'S TECHNICAL REQUIREMENTS. THE APPLICANT SHALL PROVIDE THE ARLINGTON WATER AND SEWER DIVISION WITH CALCULATIONS TO ENSURE THE DISTRIBUTION SYSTEM FOR THE AREA HAS THE NECESSARY CAPACITY TO MEET SYSTEM DEMAND REQUIRED PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.
- PRIOR TO COMMENCEMENT OF SITE CLEARING, PREPARATION, AND CONSTRUCTION, EROSION 1.1 CONTROL MEASURE SHALL BE INSTALLED CONSISTENT WITH THE APPROVED PLANS.
- I.3 NO UNCOVERED STOCKPILING OF EARTHEN AND/OR CONSTRUCTION—RELATED MATERIALS SHALL BE PERMITTED WITHIN THE ONE HUNDRED FOOT (100') WETLAND BUFFER ZONE (ALSO REFERENCED LOCALLY AS ADJACENT UPLAND RESOURCES AREA ("AURA")) OR OTHER RESOURCE AREAS.
- I.4 NO HEAVY EQUIPMENT MAY BE STORED OVERNIGHT WITHIN THE FIFTY FEET (50') OF BORDERING OR ISOLATED VEGETATED WETLAND RESOURCE AREAS, AND NO REFUELING OR MAINTENANCE OF MACHINERY OR VEHICLES SHALL BE ALLOWED WITHIN THE ONE HUNDRED FOOT (100') BUFFER ZONE, AURA, OR WITHIN ANY BORDERING OR ISOLATED VEGETATED WETLAND RESOURCE AREA OR BORDERING LAND SUBJECT TO FLOODING (BLSF).
- THERE SHALL BE NO DUMPING OF WOODY VEGETATION, LEAVES, GRASS CLIPPINGS, BRUSH, OR OTHER DEBRIS INTO A WETLAND RESOURCE AREA OR ASSOCIATED BUFFER ZONES. DUMPING OF SNOW INTO A WETLAND RESOURCE AREA IS ALSO PROHIBITED AND SHALL COMPLY WITH THE CURRENT MASS DEP BUREAU OF WATER RESOURCES SNOW REMOVAL GUIDANCE. THE FOREGOING DOES NOT APPLY TO THE CLEAN SNOW REMOVED FROM THE EMERGENCY ACCESS ROAD AS LONG AS NO SAND OR NON-APPROVED DE-ICING MATERIALS ARE USED, AND THE SNOW IS CLEAR OF ALL FOREIGN DEBRIS. AN ALTERNATIVE DE-ICING PRODUCT SUCH AS MAGNESIUM CHLORIDE (MgCI) MAY BE USED AS RECOMMENDED IN THE WINTER PARKING LOT AND SIDEWALK MAINTENANCE MANUEL PUBLISHED BY THE MINNESOTA POLLUTION CONTROL AGENCY,

- 1.6 THE APPLICANT SHALL HIRE A QUALIFIED ENVIRONMENTAL MONITOR WHO WILL REPORT TO THE BOARD AND WILL BE ON-SITE AS PROJECT CONSTRUCTION ADVANCES. THE ENVIRONMENTAL MONITOR SHALL SUBMIT AN ELECTRONIC REPORT TO THE BOARD WEEKLY DURING SITE PREPARATION WORK WITHIN THE ONE HUNDRED FOOT (100') BUFFER ZONE TO VEGETATED WETLANDS, INCLUDING AN UPDATE ON THE FUNCTIONALITY AND CONDITION OF THE EROSION CONTROL MEASURES, UNTIL SUCH TIME THAT THE SITE IS STABILIZED. THE APPLICANT SHALI PROVIDE THE BOARD WITH THE NAME(S), ADDRESS(ES) AND TELEPHONE NUMBER(S) OF THE ENVIRONMENTAL MONITOR PRIOR TO THE START OF WORK.
- WHILE ACTIVE CONSTRUCTION WORK IN UNDERWAY WITHIN THE ONE HUNDRED FOOT (100') BUFFER ZONE, AND DURING THE CREATION OF THE FLOODPLAIN COMPENSATION AREA INCLUDING REMOVAL OF VEGETATION INCLUDING INVASIVE SPECIES, FINAL GRADE ESTABLISHMENT CREATION OF SOIL PROFILE TO SUPPORT PROPOSED PLANT SPECIES, AND RESTORATION OF A DIVERSIFIED PLANT COMMUNITY, THE ENVIRONMENTAL MONITOR SHALL PROVIDE MONTHLY STATUS REPORTS TO THE BOARD TO CONFIRM THAT ALL ACTIVITIES ARE SUBSTANTIALLY IN COMPLIANCE WITH THE COMPREHENSIVE PERMIT AND ORDER OF CONDITIONS ISSUED BY THE ARLINGTON CONSERVATION COMMISSION. THE ZBA MAY REDUCE THE FREQUENCY OF INSPECTIONS OR REPORTS AS DEEMED APPROPRIATE. THE QUALIFIED ENVIRONMENTAL MONITOR SHALL ALSO SUBMIT AN ELECTRONIC REPORT WITHIN SEVEN DAYS AFTER EVERY RAIN EVENT EXCEEDING 0.5 INCHES OF RAIN IN A 24-HOUR PERIOD TO THE BOARD REGARDING THE CONDITION OF THE PROPERTY DURING AND AFTER THE RAIN EVENT. SUCH REPORT SHALL ALSO INCLUDE THE STATUS OF EROSION CONTROL MEASURES AND ANY ADDITIONAL MEASURES TO ADDRESS STORMWATER MANAGEMENT CAUSED BY SAID RAIN EVENT. THE QUALIFIED ENVIRONMENTAL MONITOR WILL ALSO REVIEW THE APPLICANT'S SWPPP INSPECTION REPORT, AS APPROPRIATE AND NECESSARY.
- I.8 ALL WORK SHALL BE CONDUCTED IN ACCORDANCE WITH THE APPROVED EROSION AND SEDIMENTATION CONTROL PLAN. WITHIN ONE WEEK OF FINAL GRADING, WEATHER PERMITTING, ALL DISTURBED AREAS LOCATED WITHIN THE WETLAND RESOURCE AREAS AND BUFFER ZONES SHALL BE STABILIZED AGAINST EROSION. THIS SHALL BE DONE EITHER BY SODDING OR BY LOAMING, SEEDING AND MULCHING ACCORDING TO SOIL CONSERVATION SERVICE STANDARDS AND THE APPROVED PLANS. STABILIZATION WILL BE COMPLETED WHEN THE SURFACE SHOWS COMPLETE VEGETATIVE COVER. TEMPORARY STABILIZATION MEASURES APPROVED BY THE BOARD'S INSPECTIONAL ENGINEER WILL BE REQUIRED SHOULD WORK BE INTERRUPTED FOR MORE THAN TEN (10) DAYS.
- I.9 THE APPLICANT. SUCCESSOR OR ASSIGNS SHALL ENSURE THE CLEANLINESS OF ALL CATCH BASINS AND ROADWAY AFFECTED BY THE PROJECT RELATED ACTIVITY. ALL CATCH BASINS WILL BE PROTECTED BY A "SILT BAG INLET PROTECTION" DEVICE OR EQUAL DURING THE PROJECT WORK PERIOD. THE APPLICANT SHALL INSPECT AND CLEAN AS NECESSARY, ALL CATCH BASINS AND SWEEP THE ROADWAY AT LEAST WEEKLY DURING CONSTRUCTION. IT MAY BE REQUIRED MORE FREQUENTLY DURING AND AFTER RAIN EVENTS. IF IT IS DEEMED NECESSARY TO REMOVE THE SILT BAG INLET PROTECTION TO PREVENT LOCALIZED FLOODING AND PUBLIC SAFETY CONCERNS. THE APPLICANT SHALL NOTIFY THE BOARD AND ARLINGTON DPW AND ALSO THE QUALIFIED ENVIRONMENTAL MONITOR.
- I.11 THE BOARD OR ITS DULY APPOINTED AGENT (WHICH MAY BY THE TOWN CONSERVATION AGENT ACTING ON BEHALF OF THE BOARD) SHALL HAVE THE RIGHT TO ENTER THE PROPERTY FOR INSPECTIONS AND EVALUATE COMPLIANCE WITH THE WETLANDS CONDITIONS CONTAINED HEREIN UPON REASONABLE NOTICE OF NOT LESS THAN TWENTY-FOUR (24) HOURS. ACCESS SHALL BE ALLOWED WITHOUT THE NEED FOR ADVANCED NOTICE IN EMERGENCY SITUATIONS WHEN NECESSARY TO PREVENT IMMINENT HARM TO WETLANDS RESOURCE AREAS.
- I.14 PRIOR TO ANY WORK COMMENCING ON-SITE, THE APPLICANT SHALL SUBMIT TO THE BOARD PROOF THAT A NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) CONSTRUCTION GENERAL PERMIT IS ACTIVE FOR THE PROJECT.
- I.15 COPIES OF ALL INFORMATION AND ALL REQUIRED REPORTS REGARDING A US EPA NPDES PERMIT AND STORMWATER POLLUTION PREVENTION PLAN (SWPPP) SHALL BE FORWARDED TO THE BOARD VIA ELECTRONIC COPY.
- 1.19 THE APPLICANT SHALL RETAIN A QUALIFIED PROFESSIONAL ENGINEER TO OVERSEE THE INSTALLATION IF THE STORMWATER SYSTEM. A STORMWATER MITIGATION REPORT SHALL BE SUBMITTED TO THE BOARD WITHIN TEN (10) DAYS OF THE COMPLETION OF THE INSTALLATION OF THE STORMWATER MANAGEMENT SYSTEM. SUCH STORMWATER MITIGATION REPORT SHALL INCLUDE AS-BUILT PLANS, PHOTOGRAPHS FROM INSTALLATION, AND A WRITTEN SUMMARY OF THE INSTALLATION OF THE STORMWATER MANAGEMENT SYSTEMS, AS WELL AS STORMWATER BEST MANAGEMENT PRACTICES (POROUS PAVEMENT, RAIN GARDENS, AND SIMILAR ELEMENTS THROUGHOUT THE PROPERTY).
- 1.20 THE APPLICANT SHELL TREAT PLANTED AREAS WITHIN RESOURCE AREAS AND BUFFER ZONES ONLY WITH SLOW RELEASE NITROGEN FERTILIZER ONCE DURING THE INITIAL PLANTING YEAR. APPLICATION OF THIS FERTILIZER IS NOT PERMITTED WITHIN TWO DAYS BEFORE AND AFTER STORM EVENTS. LAWN FERTILIZER MAY ONLY BE APPLIED TWICE PER YEAR. ONCE IN THE SPRING AND ONCE IN THE FALL, WITH THE EXCEPTION OF THE INITIAL PLANNING YEAR. THIS SHALL BE A CONTINUING CONDITION IN PERPETUITY THAT SURVIVES THE EXPIRATION OF THIS PERMIT.
- I.21 THE APPLICATION OF PLANT NUTRIENTS SHALL COMPLY WITH 330 CMR 31.00. NO OTHER HERBICIDES OR TREATMENT METHODS MAY BE UTILIZED ON THE PROPERTY UNLESS APPROVED AS PART OF THE APPROVED INVASIVE SPECIES MANAGEMENT PLAN. NO PESTICIDES OR RODENTICIDES SHALL BE USED TO TREAT PEST MANAGEMENT ISSUES WITHIN RESOURCE AREAS. THIS SHALL BE A CONTINUING CONDITION IN PERPETUITY THAT SURVIVES THE EXPIRATION OF THIS PERMIT.
- I.22 EXCEPT AS SPECIFICALLY NOTED IN CONDITION i.5, THE APPLICATION OF SAND AND/OR SALT WITHIN THE ONE HUNDRED FEET (100') OF RESOURCE AREA IS PROHIBITED.
- 1.23 THE APPLICANT SHALL CONDUCT A THOROUGH CATCH BASIN SUMP CLEANING AT ALL PROTECTED CATCH BASINS AT THE END OF CONSTRUCTION OF THE PROJECT.
- 1.25 ALL PLANT SPECIES PLANTED AND INVASIVE SPECIES REMOVED THROUGH THE PROJECT SHALL BE MONITORED FOR THREE YEARS. A SURVIVAL RATE OF EIGHTY PERCENT (80%) MUST BE MAINTAINED FOR THE APPROVED PLANTING AT THE END OF THE THIRD YEAR OF MONITORING. IF THE SURVIVAL RATE IS LESS THAN EIGHTY PERCENT (80%) AFTER THE END OF THE THIRD YEAR, THE APPLICANT MUST SUBMIT PROPOSED RECOMMENDATIONS FOR REPLACEMENT TO THE BOARD FOR ITS REVIEW AND ADMINISTRATIVE APPROVAL. A MONITORING REPORT SHALL BE SUBMITTED ANNUALLY IN JUNE FOR EACH OF THE YEARS IN THE THREE-YEAR MONITORING PERIOD, REPORTING ON THE HEALTH OF THE NEW PLANTINGS AND THE SUCCESS OF THE INVASIVE PLANT MANAGEMENT. THE APPLICANT SHALL SUBMIT THE CONTACT INFORMATION OF THE PARTY RESPONSIBLE FOR MONITORING AND MAINTAINING THE PLANTED VEGETATION TO THE ZBA. SHOULD ANY CHANGES BY MADE TO THIS PARTY, THE ZBA SHALL BE NOTIFIED. THIS SHALL BE A CONTINUING CONDITION IN PERPETUITY THAT SURVIVES THE EXPIRATION OF THIS PERMIT.
- 1.26 NO WORK SHALL BE ALLOWED IN OR WITHIN TWENTY-FIVE FEET (25') OF ANY RESOURCES AREA EXCEPT AS SHOWN ON THE APPROVED PLANS.
- 1.27 NO DISTURBANCES SHALL BE ALLOWED IN OR WITHIN FIFTY FEET (50') OF ANY RESOURCE AREA, EXCEPT AS SHOWN ON THE APPROVED PLANS.
- 1.30 ANY BUILDING OR SITE DEWATERING OPERATIONS SHALL CONFORM TO THE FOLLOWING: 1. THE APPLICANT SHALL NOTIFY THE CONSERVATION COMMISSION AND DPW THAT DEWATERING IS REQUIRED PRIOR TO COMMENCING ANY DEWATERING OPERATIONS.
  - 2. ANY CATCH BASINS, DRAINS, AND OUTFALLS TO BE USED IN DEWATERING OPERATIONS SHALL BE CLEANED OUT BEFORE OPERATIONS BEGIN.
  - 3. ANY WATER DISCHARGING AS PART OF ANY DEWATERING OPERATION SHALL BE PASSED THROUGH FILTERS, ON-SITE SETTLING BASINS, SETTLING TANK TRUCKS, OR OTHER DEVICES TO ENSURE THAT NO OBSERVABLE SEDIMENTS OR POLLUTANTS ARE CARRIED INTO ANY RESOURCE AREA, STREET, DRAIN, OR ADJACENT PROPERTY. FILTERING IS ESSENTIAL TO REMOVE ANY AUTOMOTIVE POLLUTANTS FROM THE WATER PRIOR TO DISCHARGE.
  - 4. MEASURES SHALL BETAKEN TO ENSURE NO EROSION OR SCOURING SHALL OCCUR ON PUBLIC OR PRIVATE PROPERTY, OR ON THE BANKS OR BOTTOMS OF WATER BODIES, AS A RESULT OF DEWATERING OPERATIONS. DISCHARGES ARE TO BE SET BACK AT LEAST FIFTY FEET (50') FROM BVW AND IVW.
  - 5. DEWATERING SHALL NOT TAKE PLACE IN ANY MANNER THAT LEADS TO WATER BEING DISCHARGES OR ALLOWED TO FLOW ONTO PROPERTY NOT UNDER THE CONTROL OF THE APPLICANT WITHOUT THE EXPRESS WRITTEN CONSENT OF THAT PROPERTY OWNER.

## **ABBREVIATIONS**

	BC DIT CONC	BOTTOM OF CURB BITUMINIOUS CONCRETE
	BIT CONC BVW	BORDERING VEGETATED WETLANDS
	CB	CATCH BASIN
	CB/DH	
	CLF	CHAIN LINK FENCE
	DIP	DUCTILE IRON PIPE
	DMH	
	ECB	
	FES	FLARED END SECTION
	FH	FIRE HYDRANT
	FOC	FACE OF CURB
	FD	FOUND
•	GG	GAS GATE
	HW	HEADWALL
	ILSF	ISOLATED LAND SUBJECT TO FLOODING
	IP	IRON PIPE
	ISW	ISOLATED WETLANDS
	LA	LANDSCAPED AREA
	LOW	LIMIT OF WORK
	N/F	NOW OR FORMERLY
	NTS	NOT TO SCALE
	OCS	OUTLET CONTROL STRUCTURE
	PCC	PRECAST CONCRETE CURB
	RW	RETAINING WALL
	RCP	REINFORCED CONCRETE PIPE
:	SLC	STREET LIGHT CIRCUIT
	SMH	SEWER MANHOLE
	TC	TOP OF CURB
	TEL	TELEPHONE CABLE
	VGC WG	VERTICAL GRANITE CURB WATER GATE
	<b>       </b>	WAILIN GAIL

# **LEGEND**









ISSUED FOR PERMITTING NOT FOR CONSTRUCTION



PROFESSIONAL ENGINEER

# THORNDIKE PLACE NOTICE OF INTENT

DOROTHY ROAD

ARLINGTON **MASSACHUSETTS** 

(MIDDLESEX COUNTY)

GENERAL NOTES

AND LEGEND

SEPTEMBER 6, 2023

NO. DATE DESC. 1 |02/07/24 | REV. PLANTING NOTE 11

PREPARED FOR:

ARLINGTON LAND REALTY, LLC 84 SHERMAN STREET, 2ND FLOOR CAMBRIDGE, MA

803 Summer Street

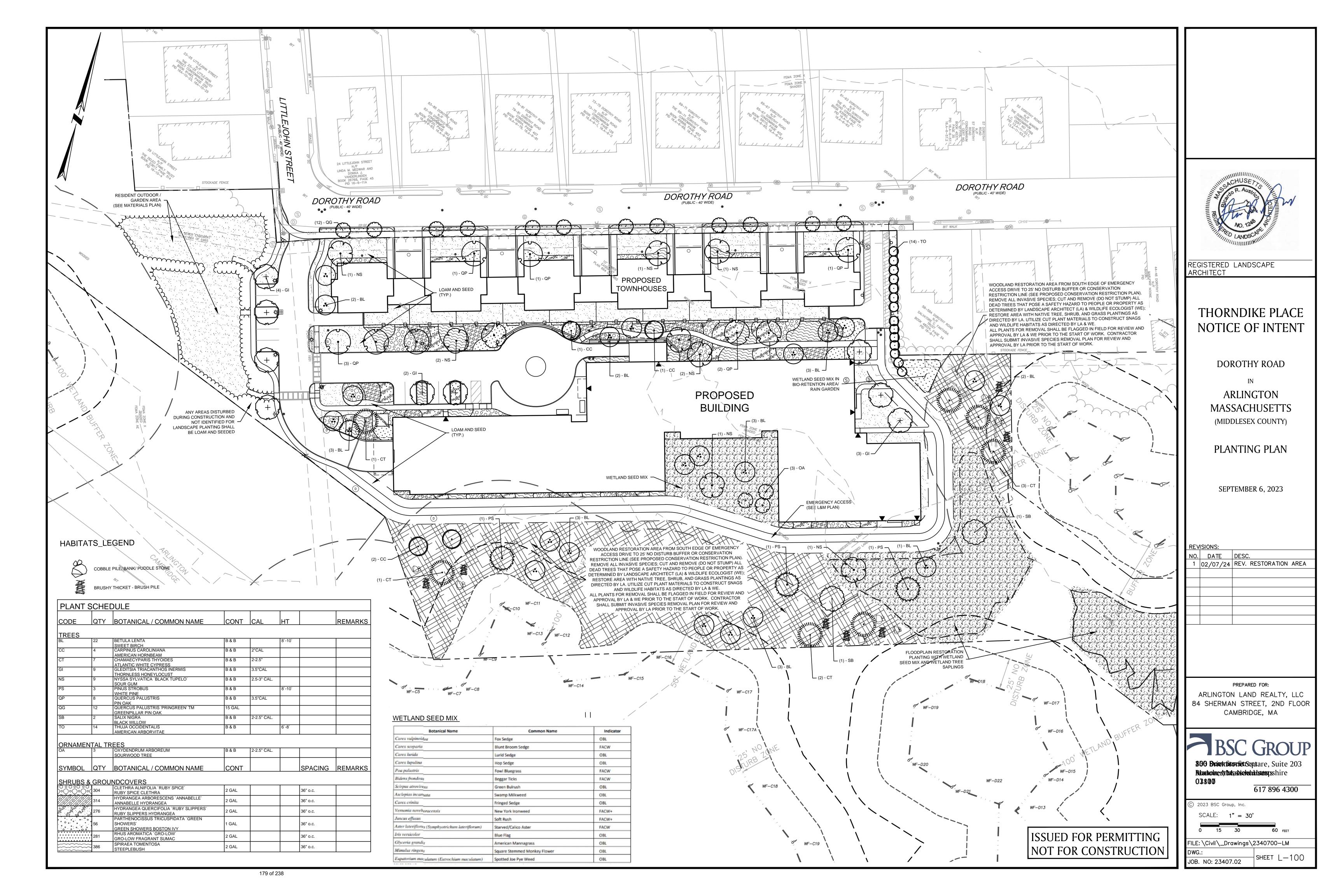
Boston, Massachusetts 617 896 4300

SCALE: NONE

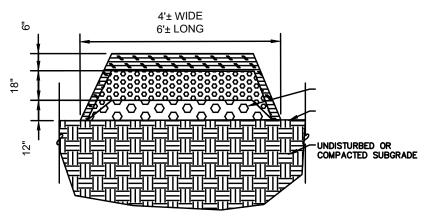
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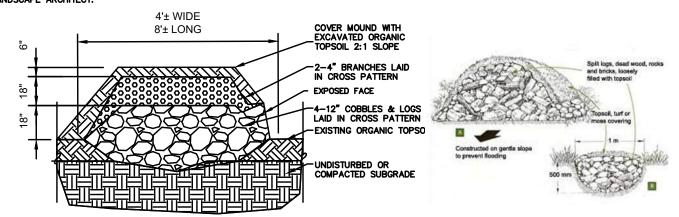
NOTES:
THICKET BRUSH PILE SHALL CONSIST OF WOODY MATERIAL CLEARED FROM THE SITE CUT TO SIZE AND PLACED AS DIRECTED.
BRUSH MAY NOT INCLUDE INVASIVE WEED SEED. REVIEW MATERIAL TO BE SET ASIDE FOR BRUSH PILE WITH DOT WETLAND
SPECIALIST OR LANDSCAPE ARCHITECT.
LOCATIONS OF WILDLIFE HABITATS WILL BE CONFIRMED BY LANDSCAPE ARCHITECT ON SITE.





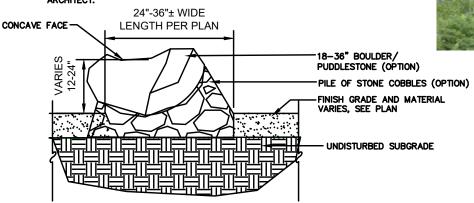
HABITAT: BRUSHY THICKET – BRUSH PILE

NOTES:
HIBERNACULA SHALL CONSIST OF STONE & WOODY MATERIAL CLEARED FROM THE SITE CUT TO SIZE AND PLACED AS DIRECTED.
BRUSH MAY NOT INCLUDE INVASIVE WEED SEED. REVIEW MATERIAL TO BE SET ASIDE FOR BRUSH PILE WITH WETLAND SPECIALIST OR LANDSCAPE ARCHITECT.



HABITAT: HIBERNACULA — EARTH, STONE, WOOD PILE
SCALE: NONE

NOTES:
COBBLES SHALL BE ROUNDED FIELD STONE 12" MAX. DIA. 3" MIN. DIA.
THE CONTRACTOR MAY UTILIZE STONE REMOVED FROM THE CONSTRUCTION
EXCAVATIONS FOR USE IN HABITAT COBBLE PILE.
PLACE COBBLE PILES AS DIRECTED BY THE DOT WETLAND SPECIALIST OR LANDSCAPE
ARCHITECT.



HABITAT COBBLE PILE / BANK / PUDDLE STONE



Engineers
Environmental Scientists
Software Developers
Landscape Architects
Planners
Surveyors

FEBRUARY 28, 2024

www.bscgroup.com

Town of Arlington Conservation Commission c/o Mr. Ryan Clapp, Conservation Administrator Robbins Memorial Town Hall 730 Massachusetts Avenue Arlington, Massachusetts 02476

RE: Response to Additional Peer Review Comments and Questions from the Commission Thorndike Place Stormwater Peer Review

Dear Members of the Arlington Conservation Commission,

On behalf of the Applicant, Arlington Land Realty, LLC, BSC Group, Inc. (BSC) is pleased to submit this response to peer review comments provided by Hatch Associates Consultants, Inc. (Hatch) and questions from the Commission relative to the Thorndike Place residential development (the Project) to be located off of Dorothy Road in the Town of Arlington. We have previously provided responses to Hatch's peer reviews in letters dated January 24, 2024, and February 13, 2024. This letter will provide responses to the items included in Hatch's Executive Summary to the Conservation Commission in their most recent memorandum dated 2024-02-14. In addition, we are providing responses to questions from the Commission included in an email from Mr. Ryan Clapp, Conservation Administrator dated February 16, 2024, and an email from Mr. Ross Mullen, PE, CFM of Hatch dated February 22, 2024. For each item, we have restated the original comment in standard text and provided our response in *italics*. We have divided the response into sections for Hatch's memo and the emails from Mr. Clapp and Mr. Mullen.

#### Hatch's Executive Summary to the Conservation Commission

After review of the proposed Thorndike Place stormwater site design relative to the Massachusetts Stormwater Handbook, Hatch has determined the project is in compliance with the following conditions:

- 1. Permanent establishment of vegetation on the south side of the senior living complex prior to runoff from the roof discharging to the wetland and verification of non-erosive velocities from this discharge.
  - As stated during the February 15, 2024, public hearing on the project, the outlet protection for this pipe will be constructed prior to any discharge. In addition, we are proposing a temporary settling basin at the outlet of this roof drain to be maintained until permanent vegetation is established in the emergency access way. This basin will be 6-inches deep and approximately 3,000 sft. for a volume of approximately 1,500 cft. The temporary settling basin will reduce the velocity of this discharge even further prior to it overflowing towards the wetlands. It should be noted that the roof drain in question is approximately 150-feet from the nearest wetland over relatively flat terrain (approximately 1.3% slope). In addition to the reduction in velocity from the outlet protection, this discharge is not expected to result in erosive velocities. In our previous response to Hatch's review dated February 13, 2024, we provided calculations demonstrating that the discharge from this pipe outlet protection during the 100-year storm event will have a velocity of 1.71 fps, which is a non-erosive velocity.
- 2. Applicant verifies that at least ten feet of separation is provided between the R-Tank<sup>XD</sup> features and the townhome basement foundations.



The R-Tank<sup>XD</sup> systems are Subsurface Structures as detailed in Volume 2, Chapter 2 of the Massachusetts Stormwater Handbook. Subsurface Structures do not have a minimum setback from foundations (please refer to Volume 2, Chapter 2 section on Subsurface Structures). These systems are less than 10-feet at their closest to the townhome foundations. As previously stated in public hearings and previous responses to reviews, the basements will be adequately waterproofed to ensure that groundwater and/or infiltration from these systems does not impact the basements.

3. Review and, if necessary, resubmission of groundwater mounding analysis of the Stormtrap ST1 infiltration feature to demonstrate compliance. Provide a defensible basis for the selected horizontal conductivity and duration of infiltration period. Verify adequate separation is provided between the senior living complex and the mounded groundwater table.

The groundwater mounding analysis of the Stormtrap ST1 infiltration has been reviewed and confirmed as appropriate. The horizontal hydraulic conductivity selected is a typical value for silty materials converted from 3.65x10-6 meters per second to feet per day. The duration of infiltration was determined using the time necessary for the required recharge volume to infiltrate in the HydroCAD model of the system. First, the portion of the required recharge volume that is routed to this system was determined (51,555 sft impervious surface resulting in 0.025 acre-feet required recharge volume). Then, a storm event was determined that resulted in this volume being infiltrated through the StormTrap system. Infiltration through the system is routed to the "discarded" outlet. As included in the Stormwater Report, infiltration ("discarded") in this storm event begins at 12.13 hours and ends at 13.35 hours. As this is the only time that stormwater is infiltrating through the system, this duration (1.22 hours) is used in the groundwater mounding analysis. This is the same methodology previously peer reviewed and accepted on behalf of the Town by BETA Group, Inc. during the Comprehensive Permit process. It must be noted that the Stormwater Handbook does not specify or require that mounding analyses be performed for a 24-hour period or that mounding analyses be performed for each design storm. In Volume 3, Chapter 1, the Stormwater Handbook states, "Mounding analysis is required when the vertical separation from the bottom of an exfiltration system to seasonal high groundwater is less than four (4) feet and the recharge system is proposed to attenuate the peak discharge from a 10-year or higher 24-hour storm (e.g., 10-year, 25-year, 50-year, or 100-year 24hour storm). In such cases, the mounding analysis must demonstrate that the Required Recharge Volume (e.g., infiltration basin storage) is fully dewatered within 72 hours (so the next storm can be stored for exfiltration). The mounding analysis must also show that the groundwater mound that forms under the recharge system will not break out above the land or water surface of a wetland (e.g., it doesn't increase the water sheet elevation in a Bordering Vegetated Wetland, Salt Marsh, or Land Under Water within the 72-hour evaluation period)." We have demonstrated through our calculations that the infiltration system will dewater within 72-hours (see drawdown calculations in the Stormwater Report) and that the groundwater mound will not break out above the land or water surface of a wetland, thus demonstrating compliance with the requirements of Standard 3.

- 4. If the applicant uses asphalt shingles on the townhomes, to manage loose grit from the shingles:
  - a. The roof drains shall remain disconnected from the Stormtrap ST1 infiltration system until after construction is substantially complete and connected prior to occupancy or
  - b. The R-Tank<sup>XD</sup> systems shall be inspected, and loose grit removed prior to occupancy.

As stated in our January 24, 2024, response and again during the public hearings, we have no objection to this requirement and request that it be included as a project specific condition by the Conservation Commission.

Separately from the Massachusetts Stormwater Handbook, our peer review also included review of the project with respect to the floodplain rules within the Code of Federal Regulations (CFR) and stormwater engineering best practices. These comments are provided to inform the Conservation Commission of the concerns Hatch has with respect to the CFR and stormwater engineering best practices:



The window of uncertainty based on the determined groundwater elevations is only 0.02-feet for the
proposed design to meet the Massachusetts Stormwater Handbook Standards 3 and 4. Infiltration
within fill soils and proximal to a wetland is atypical for stormwater site design because these soils are
typically saturated and not conducive to infiltration.

The required 2-feet of separation to groundwater is being provided. As previously stated on numerous occasions, test pits were performed in May 2023 following coordination with the Town of Arlington and observation and review by the Town's peer reviewer, Whitestone Associates. All groundwater elevations determined by BSC were validated by Whitestone. Observed elevations are shown in in the table below. Actual peer reviewed groundwater elevations under the large infiltration system serving the multifamily apartments were observed at 2.50 and -0.24. Actual peer reviewed groundwater elevations at locations of five small infiltration systems varied from 0.71 to 3.98. Out of an abundance of conservatism, we chose to design ALL infiltration systems as if groundwater had been observed at the highest elevation that was observed in just one test pit (TP-5) at the location of one small infiltration system. Thus, while BSC could have designed the StormTrap infiltration system based on the elevations determined by the two test pits within the area of that infiltration system, BSC instead utilized the most conservative elevation sitewide. Therefore, while Hatch's concern is noted, we stand by our statements that the systems have been designed in a conservative manner to comply with the Stormwater Standards. In addition, infiltration proximal to a wetland is not only typical, but is required by the Stormwater Standards of the Wetlands Protection Act and that the infiltration systems are all over 100-feet from the nearest wetland.

Test Pit	Existing Grade	Total Depth (in.)	Depth Fill (in.)	Depth Observed GW (in.)	Depth to Redox (in.)	ESHGW
TP-1	10.66	120	90	108	n/a	1.66
TP-2	8.79	104	83	97	n/a	0.71
TP-3	7.88	87	27	82	51	3.63
TP-4	7.08	96	64	68	n/a	1.41
TP-5	7.98	74	33	60	48	3.98
TP-6	6.87	132	30	110	64	1.54
TP-7	8.92	114	108	110	n/a	-0.24
TP-8	11.83	120	120	112	n/a	2.50

• The project should be sequenced so as to comply with the Code of Federal Regulations §60.3 and applicable FEMA floodplain regulations, including, if necessary, completion of a LOMR-F and/or seepage analysis to determine the structure is reasonable safe from flooding. As a member community of the National Flood Insurance Program (NFIP), the Town of Arlington is required to follow the regulatory standards of the NFIP.

As previously stated, the project will comply with all applicable FEMA regulations and requirements.

As an industry best practice, dry and/or wet flood proofing of the townhome basements should be secondary to good stormwater and drainage design that limits opportunities for surface and groundwater intrusion into structures. Hatch remains very concerned about both the lateral proximity and vertical offset of the infiltration basins to the townhomes and potential for groundwater intrusion into these structures from both the Stormtrap ST1 and R-TankXD features. The Town of Arlington Zoning Bylaws §5.8.6.A(2), which were subject to comment during the Comprehensive Permit, are based on similar flood prevention principles and require four feet of separation between the seasonal high groundwater elevation and the low floor.



As previously stated, all work proposed on this project is typical of projects throughout Massachusetts and Arlington. The review of the stormwater system before the Commission is to confirm compliance with the stormwater standards under the WPA. Further, it is not uncommon or undesirable industry practice to provide both appropriately designed underground infiltration systems together with waterproofing of structures as proposed by this project. Please refer to the memorandum prepared by McPhail Associates and submitted separately for additional information pertaining to groundwater impacts to the basements.

#### Ryan Clapp February 16, 2024, Email

1. Have applicant provide information on why less than a 24-hour storm was used for the duration of the mounding analysis.

Please see our response to Hatch's Comment 3 above.

2. Have applicant perform monitoring on well(s) (existing or new) within the area proposed for the large infiltration unit(s) which is where existing test pits 7/8 are located. Monitoring to begin in March 2024, and Commission would like monitoring data for 2-3 months (reach out to Town Engineering Department to determine appropriate timeline) and have applicant compare data to data from USGS index wells per Stormwater Handbook. Ensure stormwater standards are met even during heavy rains (particularly Standard 8) - will need review from Hatch.

As previously stated on numerous occasions, test pits were performed in May 2023 following coordination with the Town of Arlington and observation and review by the Town's peer reviewer, Whitestone Associates. All groundwater elevations determined by BSC were validated by Whitestone in accordance with standards promulgated by the Massachusetts Wetlands Protection Act and the DEP's Stormwater Handbook. Therefore, the Applicant does not agree to perform the additional monitoring requested as we stand by the information provided and that the groundwater data used for all design is conservative because it is the highest elevation found on site. The installed test pits were installed during the high groundwater season and in accordance with the specific conditioning of the Comprehensive Permit that was included at the direction of the Town's peer reviewers at BETA and with the input of this Commission. Further, the test pits were installed with the Town's selected representative at Whitestone overseeing the process. As previously stated, BSC stands behind its opinion that the stormwater system for the project has been designed employing a conservative approach and one that is appropriate for use on this site. Within the Commission's review of an abutting parcel, the designed stormwater system on such land has relied upon significantly lower groundwater elevations based upon observed groundwater only. To our knowledge, the Commission has not sought additional monitoring to verify the accuracy of such readings.

On February 15, 2024, BSC performed groundwater measurements at the three wells installed on site. In each location, groundwater elevations were measured to be lower than observed in May 2023. Elevations from both May 2023 and February 15, 2024, are included in the table below.

Test Pit	Observed GW Elevation May 2023	Observed GW Elevation February 15, 2024
TP-1	1.66	1.28
TP-6	1.54	1.07
TP-7	-0.24	-0.20

3. Have applicant provide elevation of redox feature first observed at test pit 7.

The redox features noted in Test Pit 7 were observed by Whitestone Associates, the Town's peer reviewer, approximately between elevations 4.4 and 5.6, but appropriately disregarded by Whitestone in determining the groundwater elevation in their June 28, 2023, review. As previously noted during the public hearing, as these redox features do not continue below elevation 4.4 through the bottom of the test pit (approximately



elevation -0.58), it is not indicative of a seasonal high groundwater table. This is noted in the Town's review engineer's (Whitestone) memorandum, which noted that the estimated seasonal high water table (ESHWT) depth to be 9.3 feet below grade, or an elevation of approximately -0.3, validating BSC's estimate of -0.5.

4. Have applicant respond to Hatch's February 14, 2024 letter, the June 28, 2023 Whitestone review, and to David Kaplan's question and Scott Horsley's response re: normalizing groundwater test well results to account for variation of precipitation and groundwater over several years.

Please see our above responses to Hatch's February 14, 2024, letter. There are no comments in Whitestone's June 28, 2023, letter.

The "normalizing groundwater test well results" referenced is commonly performed by a Frimpter analysis. In accordance with the DEP Stormwater Handbook (Volume 3, Chapter 1), "Depth to seasonal high groundwater may be identified based on redox features in the soil (see Fletcher and Venneman listed in References)." As stated above, BSC's design utilized the highest elevation of redox features found on the entire site as the groundwater elevation for all infiltration locations. However, in response to the Commission's request, a Frimpter analysis for all test pits in which redox features were not found is attached. The results show probable high water elevations below elevation 4 for each of these test pits. As such we affirm our previous estimate for seasonal high groundwater at elevation 4 remains an appropriate representation of the site.

#### Ross Mullen February 22, 2024, Email

In addition to the items below, Commissioner Kaplan asked Hatch to investigate if the project would continue to meet the regulatory TSS removal standards if the primary infiltration device (StormTrap) was assumed to be backwatered/filled up due to groundwater mounding.

If the primary infiltration device was filled up due to groundwater mounding, the applicant would most likely not meet Standard 4 as the runoff (inflow) to the chamber would discharge over the designed overflow, thereby bypassing the infiltration and treatment, with only minor settling of TSS in the filled infiltration device basin.

Please see our responses regarding groundwater mounding above. As the mounding analysis demonstrates that groundwater does not impede the system's ability to infiltrate in accordance with the Standard 3 requirements, the system maintains its TSS removal capabilities and compliance with Standard 4.

We believe that these responses fully respond to all open comments from the stormwater peer review. We look forward to discussing this project with you further at the upcoming public hearings on the project. Please feel free to contact me at (617) 896-4386 or drinaldi@bscgroup.com should you have any questions on the information in this report.

Sincerely,

BSC GROUP, INC.

**Dominic Rinaldi, PE** Senior Associate

Attachments: Frimpter Analysis

## USGS METHODOLOGY FOR ESTIMATING DEPTH TO SEASONAL HIGH WATER TABLE



 Project No.
 23407.02

 Subject
 Groundwater Adjustment (Frimpter)

 Location
 Thorndike Place, Arlington

 Calc By Date
 C.Thomas

 Date
 2/20/2024

 Checked by Date
 D.Rinaldi

 2/27/24

 $S_h = S_c - (S_r / OW_r) * (OW_c - OW_{max})$ 

 $S_h$  = estimated depth to probable high water level

 $S_c$  = measured depth to water at the site

 $S_r$  = range of water level where site is located (from Figure 10-4)

OW, = recorded upper limit of annual range of water level at observation well, which is used to correlate with the water levels at the site (from USGS)

OW c = measured depth to water in the observation well, which is used to correlate with the water levels at the site (from USGS)

OW max = depth to recorded maximum water level at the observation well, which is used to correlate with the water levels at the site (from USGS)

TP-1	Index Well: MA-LTW 1	04, Lexington, MA				
	Owmax	-0.05 ft				
	Owr =	3.81 ft				
	Owc =	2 ft				
	Sr=	4.2 ft				
	Sc=	9 ft				
					Sh (ft)	6.74015748
			Ground elevation	10.66	Sh (in)	80.88188976
			Probable high water elevation 3.91984252	(Ground elevation - Sh)		
TP-2	Index Well: MA-LTW 1	04, Lexington, MA				
	Owmax	-0.05 ft				
	Owr =	3.81 ft				
	Owc =	2 ft				
	Sr=	4.2 ft				
	Sc=	8.08 ft				
			Ground elevation	8.79	Sh (ft) Sh (in)	5.82015748 69.84188976
				0.79	Sii (iii)	03.04100370
			Probable high water elevation 2.96984252	(Ground elevation - Sh)		
TP-4	Index Well: MA-LTW 1	04, Lexington, MA				
	Owmax	-0.05 ft				
	Owr =	3.81 ft				
	Owc =	2 ft				
	Sr=	4.2 ft				
	Sc=	5.67 ft			Ch (ft)	3.41015748
			Ground elevation	7.08	Sh (ft) Sh (in)	40.92188976
			Probable high water elevation 3.66984252	(Ground elevation - Sh)		
TP-7	Index Well: MA-LTW 1	04, Lexington, MA	0.00304202			
	Owmax	-0.05 ft				
	Owr =	3.81 ft				
	Owc =	2 ft				
	Sr=	4.2 ft				
	Sc=	9.17 ft				
					Sh (ft)	6.91015748
			Ground elevation	8.92	Sh (in)	82.92188976
			Probable high water elevation 2.00984252	(Ground elevation - Sh)		
TP-8	Index Well: MA-LTW 1	04, Lexington, MA	2.0000 1202			
	Owmax	-0.05 ft				
	Owr =	3.81 ft				
	Owc =	2.5 ft				
	Sr=	2 ft				
	Sc=	9.33 ft				
			Ground elevation	11.83	Sh (ft) Sh (in)	7.991417323 95.89700787
			Probable high water elevation 3.838582677	(Ground elevation - Sh)		

#### SANDS AND GRAVELS IN VALLEY FLATS

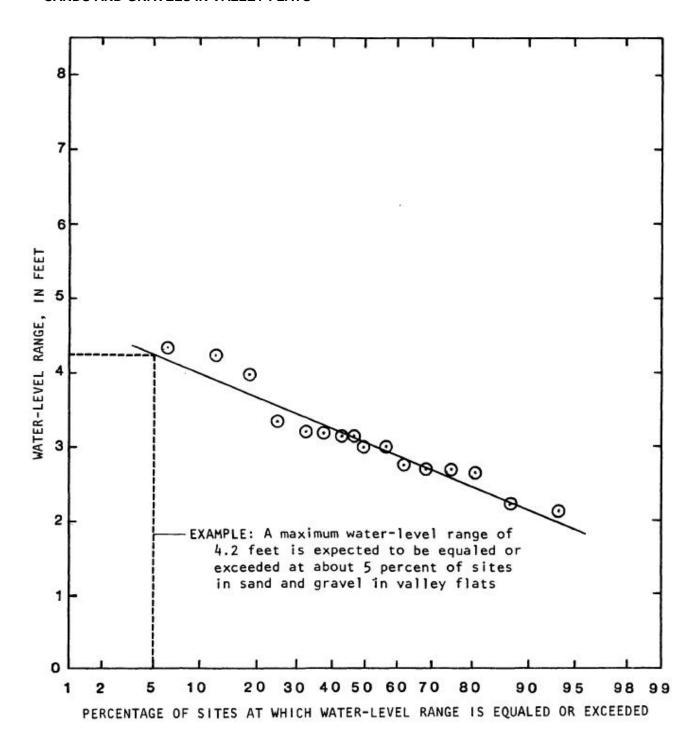


Figure 10-4. Probability of water-level range in sands and gravels in valley flats. (source: Frimpter, 1981)

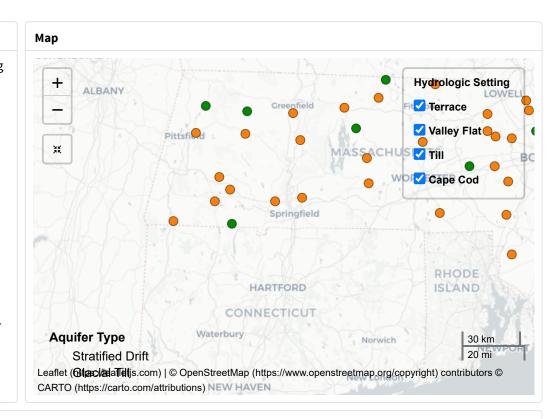
An official website of the United States government Here's how you know

(https://www.usgs.gov/)

#### **About This Information**

The Massachusetts Department of Environmental Protection is in the process of revising the procedures for the "Frimpter Method" for estimating high groundwater levels based on the recent report (https://doi.org/10.3133/sir20205036) "Updating Data Inputs, Assessing Trends, and Evaluating a Method To Estimate Probable High Groundwater Levels in Selected Areas of Massachusetts." On Cape Cod, the Cape Cod Commission uses a slightly different method (https://www.capecodcommission.org/ourwork/estimating-high-groundwater-levels/) to estimate high groundwater levels.

During the transition to the new method, the statistics for the current methodology for estimating high groundwater levels have been updated until the new methodology is approved and released. The map and table on this web page provide information on wells in the Massachusetts Observation-Well Network which have been used as index wells in the calculation of high groundwater levels. Values of highest groundwater level (OWmax), lowest groundwater level, and maximum annual range (OWr) are based on monthly and daily measurements from the beginning of the record through **September** 30, 2022. The values of OWmax and OWr are used in conjunction with Probable High Ground-Water Levels in Massachusetts, USGS Open-File Report, 80-1205 (https://doi.org/10.3133/ofr801205) to estimate probable high groundwater levels at sites in Massachusetts.



#### Table with values for the Frimpter method

Copy

Excel

Search:

Statistics for use in estimation of high groundwater levels, [Values in feet below land surface datum, OwMax, highest measured groundwater level; OWr, maximum annual range. \*, site

Site_Number 🕴	Station Na	ame	Setting \$	Aquife	r Type 🗦	Start date 🗦	Start Date	e (daily dat	ta) 🗘 Lowest water level 🗘 OwMax 🗘 🤇	OWr
422627071154002	MA-LTW 104 LEXINGTON, MA	Valley Flat	Stratified Drift	1964- 12-01	2023- 04-07	4.35	OwMax -0.05	OWr 3.81 188 of 238	https://waterdata.usgs.gov/nwis/dv? referred_module=sw&site_no=42262707115400 (https://waterdata.usgs.gov/nwis/dv? referred_module=sw&site_no=42262707115400	

413525070291904	MA-MIW 29 MASHPEE, MA	*	Stratified Drift	1976- 02-04	2022- 09-15	10.03	5.53	3.66	https://waterdata.usgs.gov/nwis/dv? referred_module=sw&site_no=413525070291904 (https://waterdata.usgs.gov/nwis/dv? referred_module=sw&site_no=413525070291904)
415433070583302	MA-MTW 82 MIDDLEBORO, MA	Till	Glacial Till	1964- 12-01		17.58	1.5	15.49	https://nwis.waterdata.usgs.gov/ma/nwis/gwlevels? site_no=415433070583302&agency_cd=USGS&format (https://nwis.waterdata.usgs.gov/ma/nwis/gwlevels? site_no=415433070583302&agency_cd=USGS&format
411555070021901	MA-NBW 228 NANTUCKET, MA	*	Stratified Drift	1976- 03-04	2022- 03-31	27.9	20.51	4.7	https://waterdata.usgs.gov/nwis/dv? referred_module=sw&site_no=411555070021901 (https://waterdata.usgs.gov/nwis/dv? referred_module=sw&site_no=411555070021901)
424520070562401	MA-NIW 27 NEWBURY, MA	Till	Glacial Till	1959- 07-01	1984- 10-17	12.68	1	10.2	https://waterdata.usgs.gov/nwis/dv? referred_module=sw&site_no=424520070562401 (https://waterdata.usgs.gov/nwis/dv? referred_module=sw&site_no=424520070562401)
									https://waterdata.usgs.gov/nwis/dv?

#### Disclaimer

Data include approved, quality-assured data that may be published, and more recent provisional data, whose accuracy has not been verified. The data are being provided to meet the need for timely best science, and are provided on the condition that neither the USGS nor the U.S. Government shall be held liable for any damages resulting from the authorized or unauthorized use of the data. Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Last updated: May 31, 2023 Return to U.S. Geological Survey New England Water Science Center (https://www.usgs.gov/centers/new-england-water-science-center/)

DOI Privacy Policy (https://www.usgs.gov/privacy) | Legal (https://www.usgs.gov/policies-and-notices) | Accessibility (https://www.usgs.gov/accessibility-and-us-geological-survey) |
Site Map (https://www.usgs.gov/sitemap) | Contact USGS (https://answers.usgs.gov/)

U.S. Department of the Interior (https://www.doi.gov/) | DOI Inspector General (https://www.doioig.gov/) | White House (https://www.whitehouse.gov/) | E-gov (https://www.whitehouse.gov/omb/management/egov/) |

No Fear Act (https://www.doi.gov/pmb/eeo/no-fear-act) | FOIA (https://www.usgs.gov/about/organization/science-support/foia)



October 08, 2021

Jenny Raitt, Director, Department of Planning and Community Development Town of Arlington 50 Pleasant Street Arlington, MA 02476

Re: Thorndike Place - Arlington, MA

Peer Review - Flood Mitigation Memo

Dear Ms. Raitt:

At the request of the Board, BETA Group, Inc. (BETA) has reviewed the memorandum entitled *Thorndike Place - Flooding Mitigation Measures*, prepared by John Hession, P.E., dated October 4, 2021. The memorandum was prepared at the request of Patrick Hanlon and summarizes stormwater flooding and mitigation measures related to the project. The memorandum discusses three (3) potential sources of stormwater flooding:

- 1. Localized Flooding
- 2. Stream Flooding
- 3. Groundwater Flooding

#### The memo summarizes the following:

Localized flooding is related to surface runoff that is directed to the roadway drainage system in Dorothy Road. The existing catch basins in the vicinity of the proposed development are at the low point of Dorothy Road and much of the neighborhood. The catch basins connect to a 12-inch diameter pipe that runs through the Thorndike Place property within a town easement and discharges to the southeast at Route 2. The memo notes that localized flooding may be due to insufficient capacity within the drainage system including the 12-inch discharge pipe.

Stream flooding is related to flow from Alewife Brook. The FEMA designated 100-year flood elevation on the site is elevation 6.8. The project will fill certain portions of the floodplain. As required, compensatory storage must be provided to mitigate for the volume of flood storage lost. As currently designed, the project proposes to provide compensatory flood storage at a ratio of 2:1 as compared to the volume of filling. This is consistent with local Arlington Wetlands Regulations.

Groundwater on site is estimated to be at elevation 3.0 based on test pits conducted in November 2020. The project design includes a garage for the senior living building and basements for the duplex units. The garage elevation is proposed at elevation 6.0 and the duplex basements at elevation 3.0. Ambrose Donovan, PE, LSP of McPhail Associates presented at the June 10, 2021 ZBA public hearing that the proposed development, including the projection of building foundations below groundwater, would have no impact on the groundwater table in the vicinity of the project. The proposed stormwater infiltration system provides less than 4 feet of separation to groundwater. The Applicant provided a groundwater

Jenny Raitt, Director, Department of Planning and Community Development October 8, 2021 Page 2 of 2

mounding analysis as required by the Massachusetts Strormwater Standards. The analysis indicates that the lateral extent of groundwater mounding related to the infiltration system would not extend beyond the property but likely would impact the foundations of four duplex units and the senior living building. The Applicant has agreed to account for the impacts of the groundwater mounding in the design of the foundations.

We offer the following comments on the memorandum:

During the design and peer review process, the proposed development has been revised so that the site generated stormwater is managed on-site and there is no increase in peak runoff rate or volume to Dorothy Road as a result of the development for storms up to and including the 100 year storm event. As requested, the Applicant modeled the stormwater using NOAA 14+ rainfall data to account for potential climate change impacts. Since there is no increase in runoff from the site, we concur that the development as designed would not exacerbate the conditions that cause localized flooding in the neighborhood.

The project is providing compensatory flood storage at a 2:1 ratio as required by Arlington's local wetlands regulations. Given the size of the Alewife Brook watershed and floodplain it is unlikely that this would result in a lower flood elevation, but we concur that it would mitigate impacts related to fill within the floodplain.

Groundwater impacts resulting from the proposed stormwater infiltration system are contained on-site based on the completed groundwater mounding analysis. The Applicant has agreed to conduct additional test pits to confirm the groundwater elevation. Based on current groundwater data, impacts to the groundwater table would not impact off site properties. However, if new data indicates a higher groundwater elevation, the design will need to be reviewed and potentially revised.

The project design has been revised during the review process such that there is no increase in offsite runoff, required compensatory flood storage is provided and groundwater impacts have been mitigated. We concur with the narrative and conclusions presented in the *Thorndike Place – Flooding Mitigation Measures* memorandum subject to any new groundwater data. While the proposed project would not be expected to exacerbate existing flooding conditions, it should not be construed that it will lessen impacts.

If you have questions about any of these comments, please feel free to contact us.

Very truly yours, BETA Group, Inc.

William P. McGrath, P.E. Senior Associate

cc: Christian Klein, Chair ZBA Patrick Hanlon, ZBA

> Kelly Lynema, Town of Arlington Paul Haverty, ZBA Counsel

Susan Chapnick, Chairperson – Arlington Conservation Commission





1900 West Park Drive, Suite 280 Westborough, Massachusetts 01581 Tel 413.256.0202 www.swca.com

January 23, 2023

Ryan Clapp Arlington Conservation Commission 730 Massachusetts Avenue Annex Arlington, MA 02476

Re: Notice of Intent Restoration Plan Peer Review Thorndike Place, Arlington, Massachusetts

Dear Mr. Clapp and Members of the Commission:

SWCA Environmental Consultants (SWCA) is pleased to submit this peer review letter report for a proposed restoration plan as part of the proposed Thorndike Place Residential Community Notice of Intent (NOI). The subject property occurs along Dorothy Road, Concord Turnpike, and Thorndike Street Extension (Assessors Map 13, Parcel 12-5.A; Map 14, Parcels 2-5 and 2-8; Map 16, Parcels 8-2, 8-3, 8-4, 8-5, 806, 8-7.A, and 8-8; and Map 17, Parcel 5-6.A). This report presents SWCA's review of the NOI documents and includes our findings and comments relative to the proposed project's compliance with the Massachusetts Wetlands Protection Act (M.G.L. c. 30 §131) (WPA) and its implementing regulations (310 CMR 10.00 et seq.) specifically addressing the proposed habitat restoration plan. The project was previously reviewed and approved under a Comprehensive Permit by the Town of Arlington including under the Arlington Wetlands Protection Bylaw (Art. 8) and its implementing regulations (effective March 16, 2023).

This review is provided by a SWCA Certified Wildlife Biologist, Professional Wetland Scientist, and Certified Ecological Restoration Practitioner. At the request of the Arlington Conservation Commission (Commission), this review only includes SWCA's review of the proposed restoration plan, including the planting plan and NOI application documents. A comprehensive review of the NOI application and supporting materials (e.g., stormwater report) was not included in our review.

BSC Group, Inc. (BSC) is representing the Applicant and property owner, Arlington Land Realty, LLC (the Applicant), and provided an NOI application dated September 6, 2023. SWCA completed a site walk with representatives from BSC and the Commission on January 5, 2024.

SWCA is in receipt of the following project-related documents as part of the review:

- "Notice of Intent (NOI), Thorndike Place Residential Community, Dorothy Rd, Arlington, MA" cover letter (dated September 6, 2023)
- "Arlington Land Realty, LLC, Thorndike Place Residential Community, Notice of Intent, Arlington, MA, Town of Arlington Conservation Commission" (dated September 2023)

- "Thorndike Place, Notice of Intent, Dorothy Road, Arlington, Massachusetts" (dated September 6, 2023)
- "Stormwater Report, Thorndike Place, Dorothy Road, Arlington, MA" (dated November 2020, revised August 2021, September 2023)

#### PROJECT NARRATIVE

#### **Project Activities & Associated Impacts**

<u>SWCA Comment 1:</u> Section 3.1.1, second paragraph. The narrative states that dead trees (i.e., snags) that do not provide wildlife habitat will be cut and stumped. Snags provide a wide variety of valuable wildlife habitat functions including shelter and forage opportunities. It is doubtful there are any snags that do not provide any wildlife habitat functions. Additionally, removal of snags does not appear to provide any ecological benefit and stumping of snags within the restoration area would likely result in unnecessary additional impacts (e.g., soil disturbance).

SWCA recommends that this language be revised to indicate that only snags that pose a hazard (e.g., leaning towards the proposed buildings and likely to result in property damage or injury) be removed and that no stumping will occur. SWCA recommends the Commission also consider a condition in the Order of Conditions (OOC), if issued, stating that any snags to be removed shall be approved by the Commission.

SWCA Comment 2: Section 3.1.1, second paragraph. The narrative states that an Invasive Species Management Plan (ISMP) for work within resource areas and their buffer zones shall be developed as required by the Comprehensive Permit. During the site walk on January 5, representatives from BSC indicated that invasive species control would be included as part of the proposed restoration efforts. It is unclear how invasive species would be controlled (e.g., mechanical removal, chemical control, etc.) or what the target species would be.

SWCA recommends the Applicant develop a detailed ISMP to be included as part of the NOI that details what the target invasive species will be, proposed specific control methodologies, a monitoring plan to measure invasive vegetation control success, and performance goals. SWCA recommends the ISMP be reviewed by an expert in invasive species removal as some species (e.g., Japanese knotweed [Reynoutria japonica]) can be extremely challenging to effectively control.

<u>SWCA Comment 3:</u> Section 3.1.1. The narrative includes multiple references to refuse that has been dumped on the site over the years. During the site walk on January 5, it was noted that as part of the proposed restoration work, the refuse would be removed as much as practicable.

SWCA recommends the Commission include a condition in the OOC, if issued, that requires all surficial refuse, including discarded clothing, metal, concrete rubble, lumber, plastic, and other similar garbage, to be removed from within the resource areas and their associated buffer zones within the limit of work. SWCA also recommends the Commission indicate that any refuse at the surface and partially buried be removed to a depth of up to 12 inches below ground (e.g., a shopping cart that has become partially buried in the soil).

SWCA Comment 4: Section 3.1.1. The narrative provides a brief discussion of the proposed restoration activities, specifically restoration plantings. However, successful habitat restorations consider a wide variety of considerations, beyond vegetation. More specifically, the wildlife habitat and vegetation

evaluation provided in Attachment G of the NOI identifies numerous wildlife habitat features including large woody debris, snags, hard mast and berry producing forage, rocks and rock piles, and others.

SWCA recommends the restoration plan consider how to improve important wildlife habitat functions within the restoration area and include methods to provide important wildlife habitat features that may be lost due to proposed impacts elsewhere on site.

<u>SWCA Comment 5:</u> Section 3.1.1. The narrative and the wildlife habitat and vegetation evaluation identify numerous native and non-native trees and shrubs within the project limit of work, including the restoration area. However, out of the 17 proposed trees and shrubs to be planted, only two (red maple [*Acer rubrum*] and American hornbeam [*Carpinus carolineana*]) are included on the plant schedule.

SWCA recommends the restoration plan be revised to include species within the restoration area that occur on-site to better represent the diversity and community structure of adjacent habitats. There are numerous trees and shrubs documented in the NOI application materials that would be suitable for the restoration area including American elm (*Ulmus americana*), black cherry (*Prunus serotina*), yellow birch (*Betula allegheniensis*), sweet birch (*Betula lenta*), box elder (*Acer negundo*), silver maple (*Acer saccharinum*), white pine (*Pinus strobus*), sycamore (*Platanus occidentalis*), black willow (*Salix nigra*), and others that are also typically readily available as nursery stock.

#### SITE PLANS

<u>SWCA Comment 6</u>: Sheet G-101, Planting Notes, Note 11. The site plans indicate that the plant species indicated on the plant list are recommendations only and that final selection of the species shall occur at the time of plant purchase, depending on availability and that the size and quantity shall not change without approval of the Applicant's landscape architect.

SWCA recommends this note be revised to indicate that the proposed planting species, sizes, and quantities may be subject to change based on availability. However, these changes should be approved by the Conservation Commission and should be approved prior to purchase.

<u>SWCA Comment 7</u>: Sheet G-101, Comprehensive Permit Notes, Comment I.5. This comment notes that dumping of woody vegetation, brush, and other debris in a resource area or its associated buffer zone is prohibited.

SWCA notes that an exception to this requirement might be considered for the restoration area as large woody debris, brush piles, and other similar wildlife habitat features provide quality habitat functions and are likely to increase the ecological value of the restored habitats.

<u>SWCA Comment 8</u>: Sheet G-101, Comprehensive Permit Notes, Comment I.25. The site plans note that the survival rate of planted species shall be 80% at the end of the third year and that a corrective action plan must be submitted if the survival rate is less than 80% at the end of the third year.

SWCA recommends the Commission consider requiring a corrective action plan to be developed by the Applicant if the 80% success rate is not met after any year of monitoring. Waiting until the third year of monitoring to develop and implement any corrective actions may unnecessarily prolong reaching the project's performance goals and may result in unnecessary disturbance to the area to rectify any adverse conditions since the restoration area will have had three years to establish.

<u>SWCA Comment 9</u>: Sheet L-100, Plant Schedule. The plant schedule includes a number of proposed cultivars within the 100-foot Buffer Zone (e.g., *Clethra alnifolia* 'ruby spice', *Hydrangea quercifolia* 

'ruby slippers', and *Hydrangea arborescens* 'annabelle'). In accordance with condition I.24 of the Comprehensive Permit, all mitigation plantings and plantings within all resource areas shall be native, non-cultivar species. Additionally, other cultivars are proposed in other areas of the site along side non cultivars of native species (e.g., pin oak [*Quercus palustris*] and green pillar pin oak [*Q. palustris* 'pringreen']).

SWCA recommends the planting plan be revised to not include any cultivars.

SWCA Comment 10: Sheet L-100. A note on the plans indicates that all dead trees (i.e., snags) that do not provide wildlife habitat per the landscape architect and wildlife ecologist should be removed. Snags provide a wide variety of valuable habitat functions for wildlife including forage for insects, perches to hunt from, shelter if there are cavities or cracks, and other functions.

SWCA recommends this note be revised to indicate that only snags that pose a hazard (e.g., may fall and land on the buildings) may be removed and that removal of any snags must be approved by the Commission.

If you have any questions or comments, please do not hesitate to contact me at either (508) 232-6668 or chase.bernier@swca.com.

Sincerely,

P. Chase Bernier, CWB, PWS, CERP Senior Natural Resources Team Lead

A-1 196 of 238



1900 West Park Drive, Suite 280 Westborough, Massachusetts 01581 Tel 413.256.0202 www.swca.com

March 6, 2024

Ryan Clapp Arlington Conservation Commission 730 Massachusetts Avenue Annex Arlington, MA 02476

Re: Notice of Intent Restoration Plan Peer Review Thorndike Place, Arlington, Massachusetts

Dear Mr. Clapp and Members of the Commission:

SWCA Environmental Consultants (SWCA) submitted a peer review letter report dated January 23, 2024 for a proposed restoration plan as part of the proposed Thorndike Place Residential Community Notice of Intent (NOI). In response to that report, BSC Group, Inc. (BSC), submitted a response to comments letter dated February 7, 2024, including revised plan materials. This report presents SWCA's review of that response to comments letter and the revised NOI documents.

#### PROJECT NARRATIVE

#### **Project Activities & Associated Impacts**

SWCA Comment 1: Section 3.1.1, second paragraph. The narrative states that dead trees (i.e., snags) that do not provide wildlife habitat will be cut and stumped. Snags provide a wide variety of valuable wildlife habitat functions including shelter and forage opportunities. It is doubtful there are any snags that do not provide any wildlife habitat functions. Additionally, removal of snags does not appear to provide any ecological benefit and stumping of snags within the restoration area would likely result in unnecessary additional impacts (e.g., soil disturbance).

SWCA recommends that this language be revised to indicate that only snags that pose a hazard (e.g., leaning towards the proposed buildings and likely to result in property damage or injury) be removed and that no stumping will occur. SWCA recommends the Commission also consider a condition in the Order of Conditions (OOC), if issued, stating that any snags to be removed shall be approved by the Commission.

BSC Response 1: BSC concurs with the recommended revision and suggests a Special Condition allowing removal of snags from the proposed restoration area that pose a hazard (e.g., leaning toward buildings and/or likely to result in property damage or personal injury) and that no stumping of removed snags shall be permitted. We additionally recommend that the Special Condition allow for a representative of the Commission be authorized to coordinate, review, and approve any snag removal on behalf of the Commission to avoid construction delays.

<u>SWCA Response 1</u>: SWCA agrees with this response and approach. No further response required.

SWCA Comment 2: Section 3.1.1, second paragraph. The narrative states that an Invasive Species Management Plan (ISMP) for work within resource areas and their buffer zones shall be developed as required by the Comprehensive Permit. During the site walk on January 5, representatives from BSC indicated that invasive species control would be included as part of the proposed restoration efforts. It is unclear how invasive species would be controlled (e.g., mechanical removal, chemical control, etc.) or what the target species would be.

SWCA recommends the Applicant develop a detailed ISMP to be included as part of the NOI that details what the target invasive species will be, proposed specific control methodologies, a monitoring plan to measure invasive vegetation control success, and performance goals. SWCA recommends the ISMP be reviewed by an expert in invasive species removal as some species (e.g., Japanese knotweed [Reynoutria japonica]) can be extremely challenging to effectively control.

<u>BSC Response 2</u>: Several invasive plant species occur on the site, most notably Japanese knotweed, oriental bittersweet (*Celastrus orbiculatus*), and garlic mustard (*Alliaria petiolata*). These occur within jurisdictional resource areas and buffer zones, as well as within non-jurisdictional areas of the site.

BSC and the Applicant will prepare an Invasive Species Management Plan (ISMP) to treat invasive plants

currently within the proposed wetland restoration area and to control their spread within the restoration area. BSC recommends that approval of such ISMP by the Commission's representative prior to the start of work be made a Special Condition of an OOC for the project.

<u>SWCA Response 2</u>: SWCA recommends that the ISMP be submitted to the Commission and reviewed by an expert in the control of invasive species prior to the issuance of an OOC. Effective control of invasive plants is critical to the success of any ISMP and may require complex management methodologies given the extent and diversity of invasive species on the site. Review of the ISMP prior to OOC issuance ensures the ISMP will be effective and that the Commission has the ability to guarantee that the plan is adequate prior to permit issuance.

<u>SWCA Comment 3:</u> Section 3.1.1. The narrative includes multiple references to refuse that has been dumped on the site over the years. During the site walk on January 5, it was noted that as part of the proposed restoration work, the refuse would be removed as much as practicable.

SWCA recommends the Commission include a condition in the OOC, if issued, that requires all surficial refuse, including discarded clothing, metal, concrete rubble, lumber, plastic, and other similar garbage, to be removed from within the resource areas and their associated buffer zones within the limit of work. SWCA also recommends the Commission indicate that any refuse at the surface and partially buried be removed to a depth of up to 12 inches below ground (e.g., a shopping cart that has become partially buried in the soil).

BSC Response 3: BSC concurs with SWCA Comment 3 and agrees such a Condition be included as part of the OOC.

SWCA Response 3: No further response required.

<u>SWCA Comment 4:</u> Section 3.1.1. The narrative provides a brief discussion of the proposed restoration activities, specifically restoration plantings. However, successful habitat restorations consider a wide variety of considerations, beyond vegetation. More specifically, the wildlife habitat and vegetation evaluation provided in Attachment G of the NOI identifies numerous wildlife habitat features including large woody debris, snags, hard mast and berry producing forage, rocks and rock piles, and others.

SWCA recommends the restoration plan consider how to improve important wildlife habitat functions within the restoration area and include methods to provide important wildlife habitat features that may be lost due to proposed impacts elsewhere on site.

BSC Response 4: The Restoration Plan has been updated to include proposed placement of coarse woody debris and stones and a few stone piles using natural materials originating from within the limit of work on the project site. The Restoration Plan maximizes the use of native berry and mast producing vegetation to benefit wildlife habitat values of the restoration area. See Appendix for details of wildlife habitat features.

SWCA Response 4: SWCA concur with these revisions. No further response required.

<u>SWCA Comment 5:</u> Section 3.1.1. The narrative and the wildlife habitat and vegetation evaluation identify numerous native and non-native trees and shrubs within the project limit of work, including the restoration area. However, out of the 17 proposed trees and shrubs to be planted, only two (red maple [*Acer rubrum*] and American hornbeam [*Carpinus carolineana*]) are included on the plant schedule.

SWCA recommends the restoration plan be revised to include species within the restoration area that occur on-site to better represent the diversity and community structure of adjacent habitats. There are numerous trees and shrubs documented in the NOI application materials that would be suitable for the restoration area including American elm (*Ulmus americana*), black cherry (*Prunus serotina*), yellow birch (*Betula allegheniensis*), sweet birch (*Betula lenta*), box elder (*Acer negundo*), silver maple (*Acer saccharinum*), white pine (*Pinus strobus*), sycamore (*Platanus occidentalis*), black willow (*Salix nigra*), and others that are also typically readily available as nursery stock.

<u>BSC Response 5</u>: BSC concurs with SWCA Comment 5 and has updated the proposed planting plan and shown approximate locations of wildlife habitats.

<u>SWCA Response 5</u>: The proposed planting plan still includes multiple species that are not representative of the of the diversity and community structure of the adjacent habitats (e.g., Atlantic white cypress [Chamaecyparis thyoides] and others). SWCA recommends the planting plan be revised to includes species that better represent the adjacent communities within the restoration area.

#### SITE PLANS

<u>SWCA Comment 6</u>: Sheet G-101, Planting Notes, Note 11. The site plans indicate that the plant species indicated on the plant list are recommendations only and that final selection of the species shall occur at the time of plant purchase, depending on availability and that the size and quantity shall not change without approval of the Applicant's landscape architect.

SWCA recommends this note be revised to indicate that the proposed planting species, sizes, and quantities may be subject to change based on availability. However, these changes should be approved by the Conservation Commission and should be approved prior to purchase.

<u>BSC Response 6</u>: BSC has made the recommended revision to the Sheet G-101 Planting Notes, Note 11. We recommend that the OCC allow administrative approval of such availability-based changes by the Conservation Commission or its authorized representative to prevent undue construction delays in making such substitutions if necessary.

SWCA Response 6: SWCA agrees with these revisions. No further response required.

<u>SWCA Comment 7</u>: Sheet G-101, Comprehensive Permit Notes, Comment I.5. This comment notes that dumping of woody vegetation, brush, and other debris in a resource area or its associated buffer zone is prohibited.

SWCA notes that an exception to this requirement might be considered for the restoration area as large woody debris, brush piles, and other similar wildlife habitat features provide quality habitat functions and are likely to increase the ecological value of the restored habitats.

BSC Response 7: Sheet G-101, Comprehensive Permit Notes, Comment 1.5 is a Condition of the Comprehensive Permit, and the wording is copied directly from that Condition. The intent of the Condition is to prohibit the dumping of materials removed during construction in the wetlands or buffer zone. In accordance with BSC Response 4 above, the Restoration Plan will be updated with detailed natural coarse woody debris and stone wildlife habitat features using materials originating from the site, but material removed from the site during construction will not be disposed of within resource areas or associated buffer zones in accordance with the Comprehensive Permit condition.

<u>SWCA Response 7</u>: SWCA agrees with this approach. No further response required.

<u>SWCA Comment 8</u>: Sheet G-101, Comprehensive Permit Notes, Comment I.25. The site plans note that the survival rate of planted species shall be 80% at the end of the third year and that a corrective action plan must be submitted if the survival rate is less than 80% at the end of the third year.

SWCA recommends the Commission consider requiring a corrective action plan to be developed by the Applicant if the 80% success rate is not met after any year of monitoring. Waiting until the third year of monitoring to develop and implement any corrective actions may unnecessarily prolong reaching the project's performance goals and may result in unnecessary disturbance to the area to rectify any adverse conditions since the restoration area will have had three years to establish.

<u>BSC Response 8</u>: Sheet G-101, Comprehensive Permit Notes, Comment I.25 is a condition of the Comprehensive Permit, and the wording is copied directly from that Condition. The Comprehensive Permit Condition was prepared upon the recommended conditions submitted to the Zoning Board by the Conservation Commission by letter dated October 14, 2021.

<u>SWCA Response</u> 8: No further response required.

SWCA Comment 9: Sheet L-100, Plant Schedule. The plant schedule includes a number of proposed cultivars within the 100-foot Buffer Zone (e.g., *Clethra alnifolia* 'ruby spice', *Hydrangea quercifolia* 'ruby slippers', and *Hydrangea arborescens* 'annabelle'). In accordance with condition I.24 of the Comprehensive Permit, all mitigation plantings and plantings within all resource areas shall be native, non-cultivar species. Additionally, other cultivars are proposed in other areas of the site along side non cultivars of native species (e.g., pin oak [*Quercus palustris*] and green pillar pin oak [*Q. palustris* 'pringreen']).

SWCA recommends the planting plan be revised to not include any cultivars.

<u>BSC Response 9</u>: BSC concurs with SWCA Comment 9 and has revised the planting plan to not include cultivars within the 100-foot buffer.

<u>SWCA Response 9</u>: The revised planting plan continues to propose a number of cultivars within the 100-foot Buffer Zone. Other cultivars are still proposed in other areas of the site.

SWCA recommends the planting plan be revised to not include any cultivars. SWCA also encourages the Applicant to utilize non-cultivars of native species throughout the site.

SWCA Comment 10: Sheet L-100. A note on the plans indicates that all dead trees (i.e., snags) that do not provide wildlife habitat per the landscape architect and wildlife ecologist should be removed. Snags provide a wide variety of valuable habitat functions for wildlife including forage for insects, perches to hunt from, shelter if there are cavities or cracks, and other functions.

SWCA recommends this note be revised to indicate that only snags that pose a hazard (e.g., may fall and land on the buildings) may be removed and that removal of any snags must be approved by the Commission.

BSC Response 10: BSC concurs with SWCA Comment 10 and has revised Sheet L-100 according to SWCA's Comments 1 and 10.

<u>SWCA Response 10</u>: This note does not appear to indicate that removal of any snags must be approved by the Commission.

SWCA recommends revising this note as to indicate that Commission approval is required for snag removal.

If you have any questions or comments, please do not hesitate to contact me at either (508) 232-6668 or <a href="mailto:chase.bernier@swca.com">chase.bernier@swca.com</a>.

Sincerely,

P. Chase Bernier, CWB, PWS, CERP Senior Natural Resources Team Lead

A-1 202 of 238

## Memorandum



**Date:** February 28,2024

**Recipient:** Oaktree Development

**Attention:** Ms. Gwendolen Noyes

**Sender:** Amy D. Apfelbaum, P.E.

**Project:** Thorndike Place; Arlington, MA

Project No: 7679

**Subject:** Updated Foundation Design Recommendations

In response to your recent request, we have reviewed the proposed scope of development for Thorndike Place in Arlington. Fronting onto Dorothy Road to the north, the site of the proposed development is bounded by residential property to the east and by Thorndike Park to the south and west. Existing ground surface across the site is generally relatively level varying from about Elevation +9 to +10 on the northern side of the site to about Elevation +7 to +8 along the southern side of the site.

It is anticipated that the site is underlain by fill and organic soils that extend to depths of about 6 to 8 feet below ground surface overlying a natural marine sand and clay deposit. The measured seasonal high groundwater levels at the site vary from Elevation -0.5 to Elevation +4. Based upon the relatively flat topography of the site and surrounding area, it is anticipated that the groundwater gradient is also relatively level across the site. The groundwater levels at the site may fluctuate seasonally and be impacted by extreme weather and flooding of the nearby Alewife Brook. Based on the provided existing conditions plan, the FEMA Zone AE and Zone X apply to the site. Portions of the buildings located within Zone AE are subject to a Base Flood Elevation of Elevation +6.8.

It is understood that the proposed primary structure will consist of 2 to 4 stories with a partially below-grade garage. The first-floor slab will be located at Elevation +16 and the parking garage slab will be located at Elevation +6. The separate townhouse buildings are planned to have their first-floor slab at Elevation +12 and basement slab at Elevation +3.

Based upon the above, foundation support for the proposed building is anticipated to be provided using conventional spread footings. The footings are anticipated to bear on the natural marine sand and/or clay deposits or on ground improvement such as rigid inclusions depending on the depth to the natural marine sand and clay bearing stratum. Rigid inclusions are commonly used in urban areas to mitigate the noise and vibrations resulting from pile driving activities. Noise and vibrations generated from rigid inclusion installation operations are typical of common construction equipment such as excavators and vibratory compactors, and are significantly less than those generated by pile driving operations. Also, the installation time for rigid inclusions is significantly less than that required for pile installation.

## Memorandum



Finally, it is recommended that the lowest level slabs be designed as a waterproofed slab and the waterproofing should extend up the foundation walls to ground surface. The lowest level slab and foundation walls will need to be designed to resist hydrostatic pressure. Buildings located within FEMA Zone AE should be designed to resist hydrostatic pressure resulting from the design flood level plus 1-foot which is understood to be equivalent to Elevation +.7.8. This will protect the below-grade spaces from possible groundwater intrusion and from potential seasonal fluctuations in the groundwater level and flooding.

Given that the primary garage is located about 2 feet above the observed groundwater and the individual townhouse basements are located only slightly below the highest observed groundwater level, the garage and basements should not have an impact on seasonal groundwater fluctuations or on the relatively flat groundwater gradient (flow) in the area surrounding the proposed building.

https://mcphailintranet-my.sharepoint.com/personal/aapfelbaum\_mcphailgeo\_com/Documents/Thorndike Place Building Memo Update 022824.docx AJD/ADA/ntd

#### **MEMORANDUM**

TO: TOWN OF ARLINGTON ZONING BOARD OF APPEALS – SENT VIA EMAIL

**FROM:** JOHN HESSION, PE

**SUBJECT:** THORNDIKE PLACE – FLOODING MITIGATION MEASURES

**DATE:** OCTOBER 4, 2021

**CC:** ZBA@TOWN.ARLINGTON.MA.US

CHRISTIAN KLEIN, CHAIR

PATRICK HANLON

PAUL HAVERTY, BLATMAN, BOBROWSKI & HAVERTY, LLC

GWEN NOYES AND ARTHUR KLIPFEL, ARLINGTON LAND REALTY

STEPHANIE KIEFER, SMOLAK & VAUGHAN

During the September 9, 2021 public hearing, Patrick Hanlon requested that the Applicant provide a summary of evidence that the Thorndike Place project, as currently proposed, will not increase flooding on adjacent or downstream properties. Three types of potential flooding have been discussed and addressed during the design, review, and public hearing process: localized flooding, stream flooding and groundwater flooding which are discussed further below.

#### **Localized Flooding**

Localized flooding refers to smaller scale flooding that can occur anywhere in a community. This can include shallow flooding that occurs in low-lying areas after a heavy rain, flooding in small watersheds, ponding, and localized stormwater and drainage problems. The street flooding experienced on Dorothy Road and Littlejohn Street after an intense rainfall event is considered localized flooding. The intersection of Dorothy and Littlejohn is a low point in the neighborhood with two catch basins at the Dorothy/Littlejohn intersection and two catch basins in the vicinity of 56 and 57 Dorothy Road. These catch basins discharge through a municipal 12" storm drain across the Thorndike Place property to the southeast at Route 2. In existing conditions, only a very small area (0.16 acres) of the undeveloped site discharges to Dorothy Road/Littlejohn Street. With the proposed development, the portion of the project site contributing stormwater runoff at Dorothy Road/Littlejohn Street has been reduced and the peak rate of runoff and volume of runoff is reduced when compared to existing conditions.

The proposed project is not contributing any new runoff to the existing low area at the Dorothy Road/Littlejohn Street intersection and is, therefore, not increasing the localized flooding. This has been confirmed by the Town's Peer review consultant, BETA Group, in their September 8, 2021 Comprehensive Permit Civil / Wetland Peer Review #5.

The project's stormwater management system has been designed to meet and exceed the Massachusetts Stormwater Standards. In particular, the proposed stormwater runoff rates are equal to or less than existing runoff rates for the 2 through 100-year storm events using NOAA 14+ precipitation data, which data exceeds both: a) the Natural Resources Conservation Service (NRCS) precipitation data (required by the Massachusetts Stormwater Standards) and b) the Cornell precipitation data (required by the Arlington Wetlands Protection Regulations).

In reviewing the localized flooding concerns noted by neighbors, it appears that there may be capacity issues in the Town's existing 12" storm drain that discharges across the Thorndike Place property. Based on the size and slope of the Town's existing storm drain, the full flow capacity is less than 4 cubic feet per second (cfs). Likewise, it appears that the Town has not sought to maintain its storm drain easement, which is overgrown, and it is possible that roots may also be impacting the capacity. The Town's capacity is likely not sufficient given the increasing intensity and frequency of rainfall events. Additionally, there is no emergency overflow or relief for this low area. When the capacity of the existing municipal storm drain system is exceeded, stormwater ponds in the street and overflows onto private property; in particular the duplexes (#'s 61 – 85 constructed primarily between 2014 and 2017) on the north side of Dorothy Road with garages under the buildings.

The construction of Thorndike Place may provide an opportunity for the Town to clear its existing easement of vegetation and increase the capacity of the municipal system to minimize the likelihood of localized flooding in the future. Based on the date of the easement, the existing storm drain outfall was constructed in the 1950's. Typically, in the 1950's the design for stormwater system pipes and inlet grates was based on a 10-year storm intensity. The current Town of Arlington Stormwater Management Standards requires a 25-year storm intensity for design.

#### **Stream Flooding**

The current FEMA 100-year flood elevation (el = 6.8). represents the stream flooding associated with Alewife Brook. FEMA completed an update of the Flood Insurance Study (FIS) in 2016. The FIS is a compilation and presentation of flood hazard areas along rivers, streams, coasts, and lakes within a community.

The Massachusetts Wetlands Protection Act (WPA) and the Arlington Wetlands Protection Regulations regulate work within Bordering Land Subject to Flooding (BLSF). The boundary of BLSF is defined as the extent of the FEMA 100-year floodplain. Under the WPA, compensatory storage shall be provided for all flood storage volume that will

be lost as the result of a proposed project within Bordering Land Subject to Flooding. Compensatory storage shall mean a volume not previously used for flood storage and shall be incrementally equal (1:1 ratio) to the theoretical volume of flood water at each elevation, up to and including the 100-year flood elevation, displaced by the proposed project. Such compensatory volume shall have an unrestricted hydraulic connection to the same waterway or water body. The Arlington Wetlands Protection Regulations compensatory flood storage at a 2:1 ratio for all flood storage volume that will be lost at each elevation.

The Thorndike Place project does propose filling within BLSF but also meets the more stringent Arlington Wetlands Protection Regulations 2:1 compensatory storage volume and unrestricted hydraulic connection requirements. By meeting the performance standard, the proposed project will not contribute to increased flooding on adjacent or downstream properties. This has been confirmed by the Town's Peer review consultant, BETA Group, in their September 8, 2021 Comprehensive Permit Civil / Wetland Peer Review #5.

#### **Groundwater Flooding**

Based on the test pits conducted on November 25, 2020, groundwater on the site is estimated to be at elevation 3.0. The Applicant has agreed to conduct additional groundwater testing to confirm the seasonal maximum high groundwater elevations on the site. With the available data, the project was redesigned to raise the senior living building's garage to elevation 6.0 and the duplex basements to elevation 3.0, both at or above the existing groundwater elevation. Additionally, Ambrose Donovan, PE, LSP of McPhail Associates presented at the June 10, 2021 ZBA public hearing that the proposed development, including the projection of building foundations below groundwater, would have no impact on the groundwater table in the vicinity of the project.

The proposed stormwater infiltration system has been designed based on the observed groundwater elevation. Since there is less than 4 feet of proposed separation between the bottom of the infiltration system and the groundwater, the Massachusetts Stormwater Standards require a groundwater mounding analysis. The groundwater mounding analysis is included in Section 6.05 of the Stormwater Report revised August 2021. Per BETA Group's June 25, 2021 Comprehensive Permit Civil / Wetland Peer Review #3, the analysis indicates that the lateral extent of the ground water mound will extend to the foundations of four townhouse units as well as the foundation of the senior living building. The mounding is a localized effect and should not impact overall groundwater elevations in the area. However, it should be considered in the design of the building foundations. The infiltration system impacts will be considered, and appropriate waterproofing will be incorporated in the foundation design of the townhouses, garages/carports and the senior living building.

#### **Conclusion**

Thorndike Place, as designed, will not contribute to increased localized flooding, stream flooding or groundwater flooding on adjacent or downstream properties. Additionally, it is important to note that the Thorndike Place design considers climate change and resiliency by incorporating NOAA 14+ precipitation data, which exceeds current regulatory requirements, in the design of the stormwater management system and that the proposed building first floors are located above the projected 2070 Sea Level Rise/Storm Surge (SLR/SS) 100-year flood elevation projecting future residents from the potential of increased flooding.

#### OFFICE OF THE SELECT BOARD

ERIC D. HELMUTH, CHAIR JOHN V. HURD, VICE CHAIR DIANE M. MAHON STEPHEN W. DECOURCEY LENARD T. DIGGINS



730 MASSACHUSETTS AVENUE TELEPHONE 781-316-3020 781-316-3029 FAX

## TOWN OF ARLINGTON MASSACHUSETTS 02476-4908

#### **MEMORANDUM**

TO:

Christopher M. Leich

President, Arlington Land Trust

FROM:

**Britton Mallard** 

Administrative Assistant

DATE:

March 5th, 2024

RE:

Placement of Two Monitoring Wells on Town Property Approval

The Select Board at the meeting of March 4, 2024, voted to approve the placement of two monitoring wells on Town property.

Attachment

Cc:

Jim Feeney, Town Manager David Morgan, DPCD Michael Ciampa, ISD



February 27, 2024

Officers

Eric Helmuth Chair, Select Board Town of Arlington

President
Christopher Leich

Dear Mr. Helmuth,

Vice President Clarissa Rowe

Clerk Ann LeRoyer

Treasurer John F. Page

Directors
Nellie Aikenhead
Peter Belknap
Lolly Bennett
Nora Frank
Carol Kowalski
Bancroft Poor
Ted Siegan

Advisory Board Cindy Friedman Sean Garballey Cathy Garnett Jay Kaufman Kevin Knobloch Anne Paulsen Dave Rogers As you may know, there is considerable uncertainty about the groundwater levels on the site of the proposed "Thorndike Place" development in East Arlington (also known as the Mugar property). Arlington Land Realty, L.L.C., the developer of Thorndike Place, is required by the terms of the comprehensive permit with conditions issued by the Zoning Board of Appeals on December 1, 2021 to provide accurate estimated seasonal high groundwater measurements using continuously monitored wells, in order to ensure that the project does not exacerbate area flooding and damage adjacent wetlands. These measurements must also be presented to the Conservation Commission in connection with its ongoing NOI hearing concerning Thorndike Place. While the developer contends that it has correctly determined estimated seasonal high groundwater levels through the use of single-measurement test pits, significant questions have been raised in the course of the Conservation Commission hearings as to the accuracy of these measurements since they were not determined through the use of the required continuously monitored wells.

In order to provide robust comparative data concerning seasonal high groundwater levels, the Arlington Land Trust, Inc. respectfully requests permission to place two monitoring wells on Town land abutting the southeast side of Dorothy Road. The wells would be constructed with six-inch PVC pipe, and would not protrude from the ground. Because these wells would be a short distance from the points at which the developer is required to conduct its own measurements, they would serve as useful references for evaluating the accuracy of the developer's claimed groundwater levels. The wells would be placed approximately three feet from the curb on Dorothy Road, and the work would be carried out by Vetrano Construction, an experienced, licensed, and bonded general contractor, under Town supervision. The wells would be continuously monitored during the seasonal high groundwater months of March, April, and May, using reliable peizometer technology, and the monitoring results would be made available to all interested parties.

Please let me know if you have any questions or would like any additional information. Thank you for your attention to this important and timely matter.

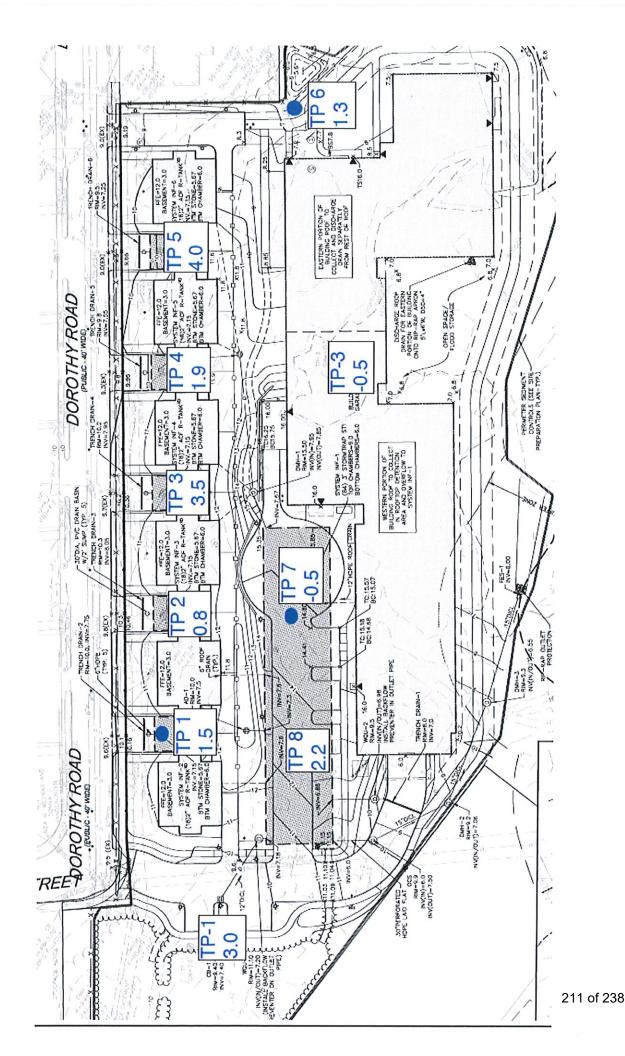
Yours sincerely,

Christopher M. Leich

President, Arlington Land Trust, Inc.

husdap A. Lid

cc: James Feeney, Town Manager Michael Cunningham, Esq., Town Counsel





### **Town of Arlington, Massachusetts**

### Request for Determination of Applicability: 459 Mystic Street.

#### Summary:

Request for Determination of Applicability: 459 Mystic Street.

This public hearing will consider a Request for Determination of Applicability for the construction of an addition and deck expansion at 459 Mystic Street, within the 100-foot Buffer Zone to Bordering Vegetated Wetlands.

#### **ATTACHMENTS:**

	Type	File Name	Description
ם	Reference Material	459_Mystic_Street_RDA_Application.pdf	459 Mystic Street RDA Application.pdf



### **Massachusetts Department of Environmental Protection** Bureau of Water Resources - Wetlands

# WPA Form 1- Request for Determination of Applicability Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

**General Information** 



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1.	Applicant:							
	Scott	Grady						
	First Name	Last Name						
	1105 Massachusetts Ave #2E							
	Address							
	Cambridge	MA	02138					
	City/Town	State	Zip Code					
	617-620-2420	swgrady@gmai	il.com					
	Phone Number	Email Address						
2.	Property Owner (if different from Applicant):							
	Jeff Selberg and Gail Ockerbloom							
	First Name	Last Name						
	459 Mystic Street							
	Address							
	Arlington	MA	02474					
	City/Town	State	Zip Code					
	781-910-1909	gail@studioonthecommon.com						
	Phone Number	Email Address (if kr	nown)					
3.	Representative (if any)							
	First Name	Last Name						
	Company Name							
	Address							
	City/Town	State	Zip Code					
	Phone Number	Email Address (if kr	nown)					

ow to find Latitude		
nd Longitude	•	

459 Mystic Street	Arlington		
Street Address	City/Town		
42.43509	71.15532		
Latitude (Decimal Degrees Format with 5 digits after decimal e.g.	Longitude (Decimal Degrees Format with 5 digits after		
XX.XXXXX)	decimal e.gXX.XXXXX)		
78-1	34458		
Assessors' Map Number	Assessors' Lot/Parcel Number		
b. Area Description (use additional paper, if necess Lot extends from Mystic St. to Upper Mystic Lake. Ge			
c. Plan and/or Map Reference(s): (use additional page	aper if necessary)		
Locus Deed: Book 35457 Page 541	6/16/2012		
Title	Date		
Plan Reference: Plan Book 831 of 1941			
Title	Date		
	213 of 238		



Massachusetts Department of Environmental Protection ANNING & CONFIDENT Y Bureau of Water Resources - Wetlands

# WPA Form 1- Request for Determination of Applicability 1: 05 Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

C.		Determinations	
1.	l re	equest the Arlington make the following Conservation Commission	owing determination(s). Check any that appl
	$\boxtimes$	a. whether the <b>area</b> depicted on plan(s) and/or map jurisdiction of the Wetlands Protection Act.	o(s) referenced above is an area subject to
		b. whether the <b>boundaries</b> of resource area(s) departure above are accurately delineated.	icted on plan(s) and/or map(s) referenced
		c. whether the <b>Activities</b> depicted on plan(s) referen	nced above is subject to the Wetlands
		d. whether the area and/or Activities depicted on pla jurisdiction of any <b>municipal wetlands' ordinance</b>	
		Name of Municipality	
		e. whether the following <b>scope of alternatives</b> is adepicted on referenced plan(s).	dequate for Activities in the Riverfront Area a
D.		Signatures and Submittal Requires	
and	acc	y certify under the penalties of perjury that the forego companying plans, documents, and supporting data a dge.	oing Request for Determination of Applicabilit are true and complete to the best of my
Offi	се и	certify that the property owner, if different from the avere sent a complete copy of this Request (including neously with the submittal of this Request to the Con	all appropriate documentation)
		by the applicant to send copies in a timely manner mination of Applicability.	nay result in dismissal of the Request for
Sigr	natu	res:	
		nderstand that notification of this Request will be place with Section 10.05(3)(b)(1) of the Wetlands P	
		(My sall)	2/11/24
	Sign	ature of Applicant	Date
	Sign	ature of Representative (if any)	Date

#### **Notification to Abutters**

By Hand Delivery, Certified Mail (return receipt requested), or Certificates of Mailing

This is a notification required by law. You are receiving this notification because you have been identified as the owner of land abutting another parcel of land for which certain activities are proposed. Those activities require a permit under the Massachusetts Wetlands Protection Act (M.G.L. c. 131, § 40).

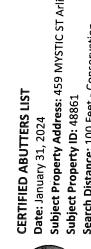
In accordance with the second paragraph of the Massachusetts Wetlands Protection Act, and 310 CMR 10.05(4)(a) of the Wetlands Regulations, you are hereby notified that:

A. A Notice of Intent was filed with the Arlington Conservation Commission on February 21, 2024 seeking permission to remove, fill, dredge, or alter an area subject to protection under M.G.L. c. 131 §40. The following is a description of the proposed activity/activities:

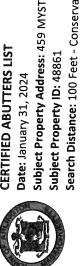
Proposed addition to existing single family residence (7 ft. x 24 ft.), with addition to existing deck (7.5 ft. x 10 ft.). Work is located at the rear of the dwelling and does not extend further into the 100ft. buffer zone beyond the existing house.

- B. The name of the applicant is: Gail Ockerbloom and Jeff Selberg.
- C. The address of the land where the activity is proposed is: 459 Mystic Street, Map 78-1, Parcel 34458.
- D. Copies of the Notice of Intent may be examined or obtained at the office of the Arlington Conservation Commission, located at 730 Massachusetts Ave. The regular business hours of the Commission are M-F 8am – 4pm, and the Commission may be reached at 781-316-3012 or 781-316-3229. You may also send an email to mmuszynski@town.arlington.us. For the DEP Northeast Regional Office: 978-694-3200.
- E. Copies of the Notice of Intent may be obtained from the applicant or their representative by calling Scott William Grady Architect (Representative) at 617-620-2420. An administrative fee may be applied for providing copies of the NOI and plans.
- F. Information regarding the date, time, and location of the public hearing regarding the Notice of Intent may be obtained from the Arlington Conservation Commission. Notice of the public hearing will be published at least five business days in advance, in the Arlington Advocate. Hearing Date: March 7th at 7pm

Notification provided pursuant to the above requirement does not automatically confer standing to the recipient to request Departmental Action for the underlying matter. See 310 CMR 10.05(7)(a)4.



214 of 238



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#### Affidavit of Service

(Please return to Conservation Commission)

I, 1011 W. Apply , being duly sworn, do hereby state as follows: on 2/21/24 , I mailed a "Notification to Abutters" in compliance with the second paragraph of Massachusetts General Laws, Chapter 131, s.40, the DEP Guide to Abutter Notification dated April 8, 1994, and the Arlington Wetlands Protection Bylaw, Title V, Article 8 of the Town of Arlington Bylaws in connection with the following matter:
Connection with the following matter.

[Brief description of work and address of work.]

#59 MYSTIC STREET | HALILIATON |

ADDITION TO EXISTING DECK (7-6' × 14-0")

The form of the notification, and a list of the abutters to whom it was provided and their addresses, are

attached to this Affidavit of Service.

Signed under the pains and penalties of perjury, this 20 TH day of FEMILY

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#### **Bylaw Filing Fees and Transmittal Form**

#### Rules:

- 1. Fees are payable at the time of filing the application and are non-refundable.
- 2. Fees shall be calculated per schedule below.
- 3. Town, County, State, and Federal Projects are exempt from fees.
  4. These fees are in addition to the fees paid under M.G.L. Ch. 131, s.40 (ACT).

See Schedule (ACC approved 1/8/15):

\$	No./Area	Category
		(R1) RDA- \$150 local fee, no state fee
		(N1) Minor Project - \$200 (house addition, tennis court, swimming pool,
\$200		utility work, work in/on/or affecting any body of water, wetland or
/ -		floodplain).
		(N2) Single Family Dwelling - \$600
		(N3) Multiple Dwelling Structures - \$600 + \$100 per unit all or part of
		which lies within 100 feet of wetlands or within land subject to flooding.
		(N4) Commercial, Industrial, and Institutional Projects -
		\$800 + 50¢/s.f. wetland disturbed; 2¢/s.f. land subject to flooding or buffer
		zone disturbed.
		(N5) Subdivisions - \$600 + \$4/l.f. feet of roadway sideline within 100 ft. of
		wetlands or within land subject to flooding.
		(N6) Other Fees - copies, printouts; per public records law
		(N7) Minor Project Change - \$50
		(N8) Work on Docks, Piers, Revetments, Dikes, etc - \$4 per linear foot
		(N9) Resource Boundary Delineation (ANRAD) - \$1 per linear foot
		(N10) Certificate of Compliance (COC or PCOC) - No charge if before
		expiration of Order, \$200 if after that date.
		(N11) Amendments - \$300 or 50% of original local filing fee, whichever is
		less.
		(N12) Extensions -
		a. Single family dwelling or minor project - \$100.
		<b>b. Other</b> - \$150.
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		(N13) Consultant Fee -per estimate from consultant
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100	TOTAL	

Note: Submit this form along with the forms submitted for the ACT - the "Wetlands Filing Fee Calculations Worksheet," and the "Notice of Intent Fee Transmittal Form."

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#### **Legal Notice Charge Authorization**

DATE:	
TO:	legals@wickedlocal.com
Arlington Advoc	ize Community Newspapers to bill me directly for the legal notice to be published in the cate newspaper on for a public hearing with the Arlington ommission to review a project at the following location:
Thank you. Signed:	Way and the second of the seco
Send bill to:	
1105 464 CLUBRY	APTO (Address)  WHITH AVE HITH  OAE, WH 02139  O-2420 (Phone)
-4-/	

## **LIST OF DOCUMENTS**

Site Plan / Google Maps

Site Plan / Registry of Deeds

Site Plan / Documented Survey

A-0 Existing Basement Plan

A-0a Proposed Foundation Plan

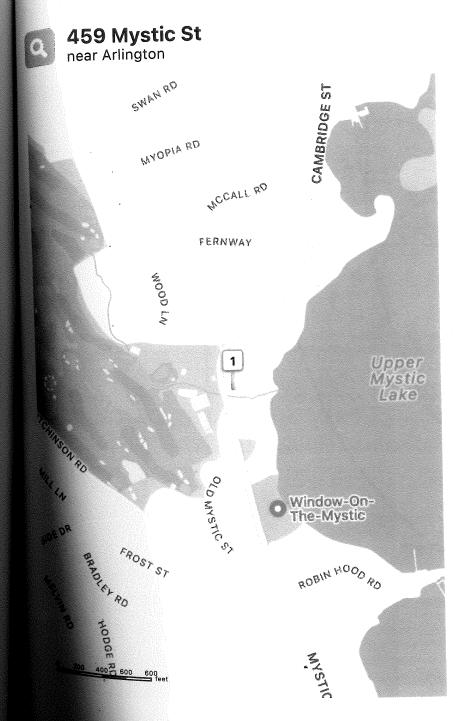
A-1 Existing First Floor Plan

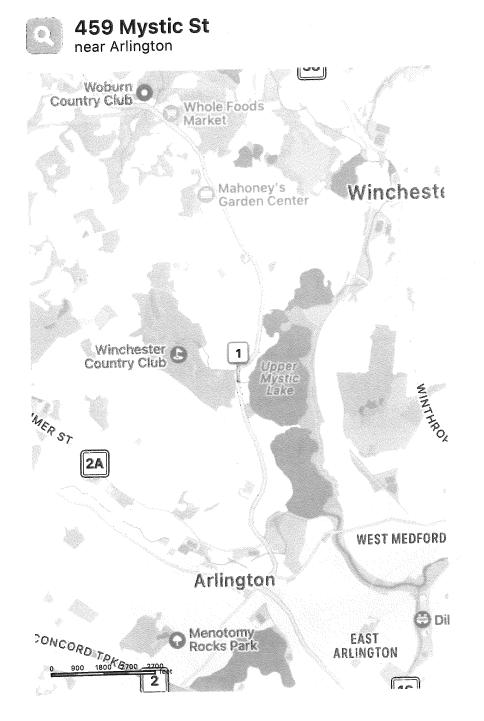
A-1a Proposed First Floor Plan

A-2 Existing Second Floor Plan A-2a Proposed Second Floor Plan

A-3 Existing and Proposed Rear Elevations

A-4 Existing and Proposed Side Elevations

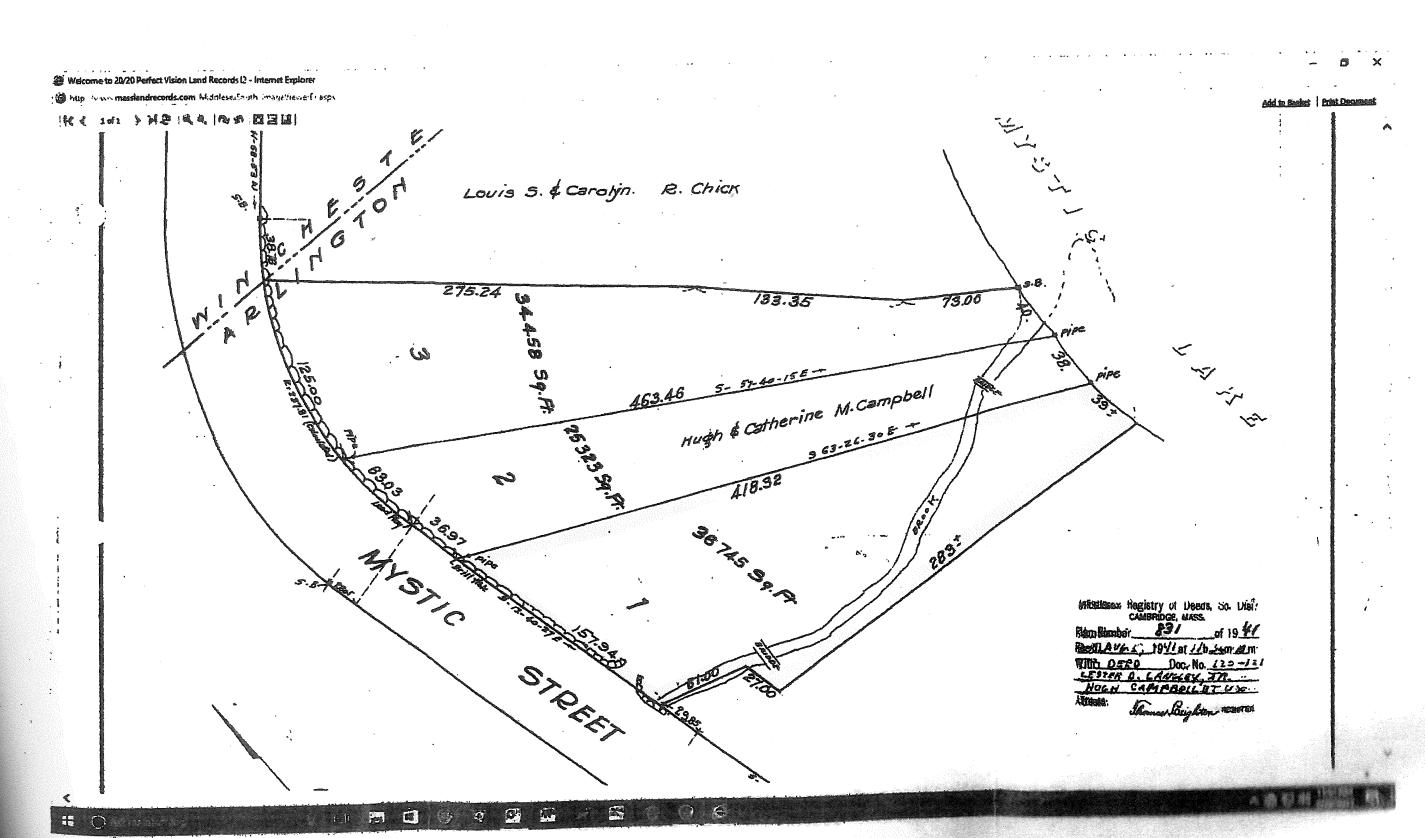


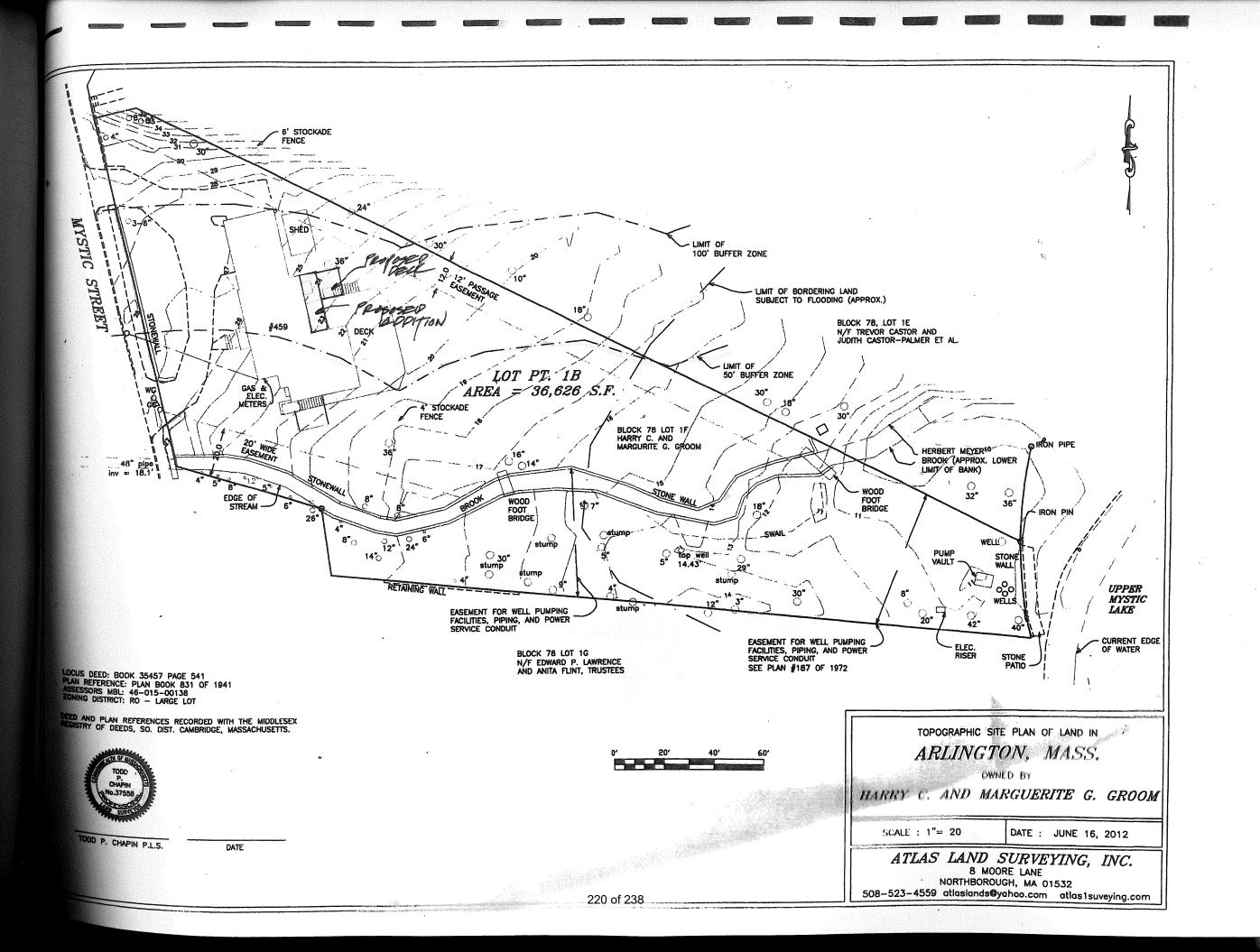


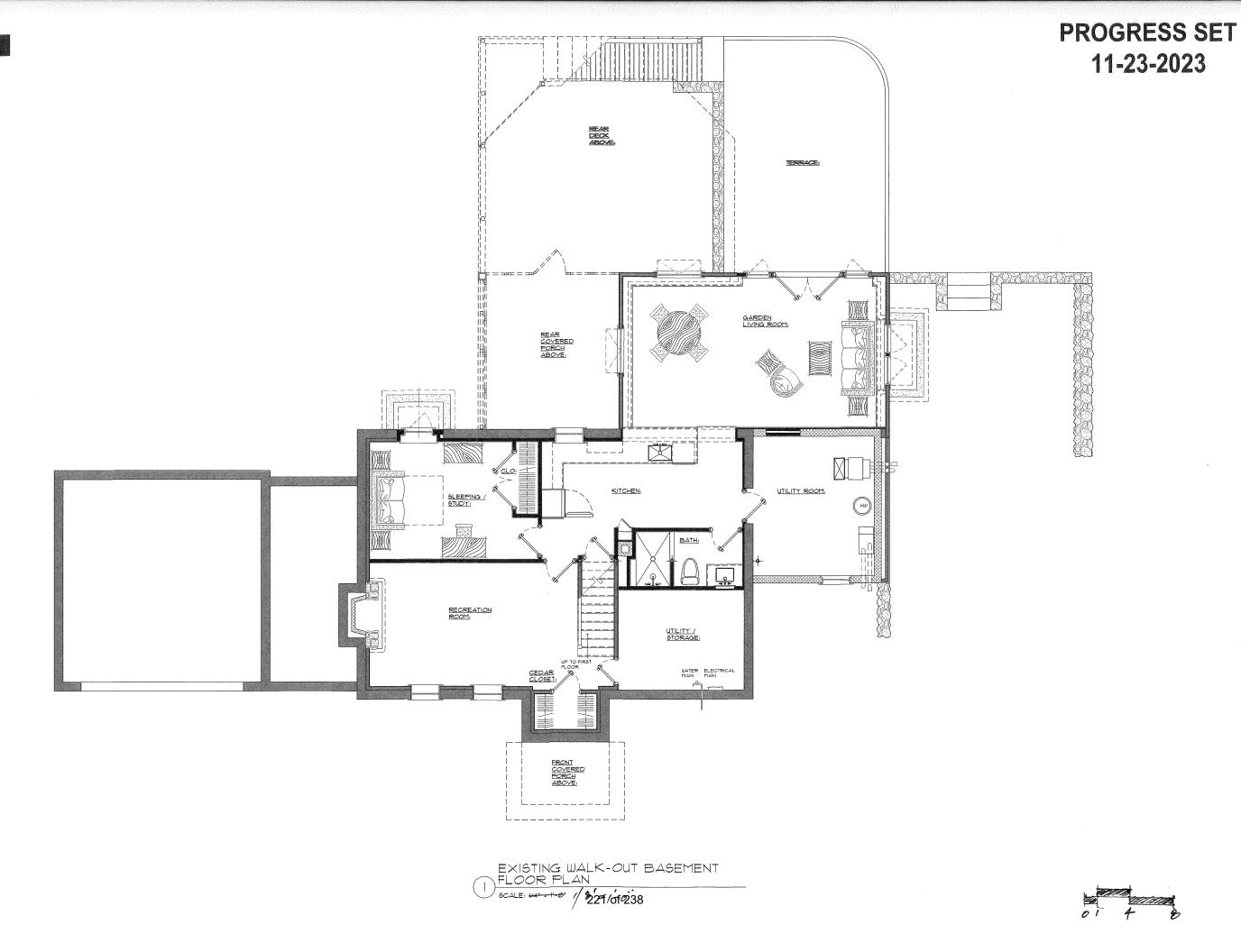


459 Mystic St 459 Mystic St

LATITUDE: 42.43509 LONGITUDE: 71.15532







BOSTON

1105 Massachusetts Ave. #2E Cambridge, MA 02138 Cell 617.620.2420 Fax 617.354.8684 Email swgrady@gmail.com

CAPE & ISLANDS

CLIENT

GAIL
OCKERBLOOM
AND JEFF
SELBERG
RESIDENCE AT
459 MYSTIC
STREET
ARLINGTON, MA.

DRAWN: CCSOARES

DATE: 11.23.2023

APPROV. BY: **SWGRADY** 

REVISED:

SCALE: AS SHOWN

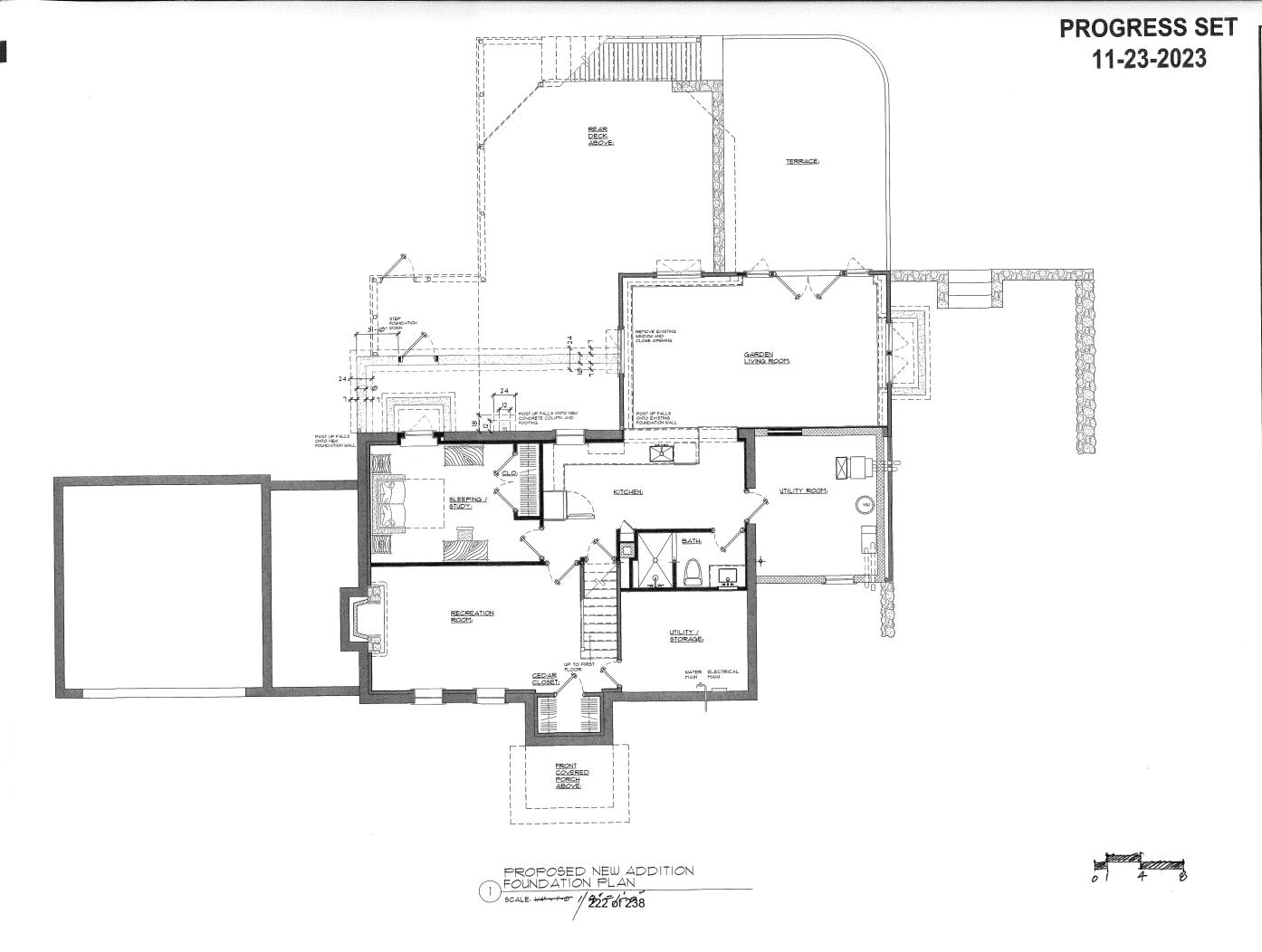
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BOSTON

1105 Massachusetts Ave. #2E Cambridge, MA 02138 Cell 617.620.2420 Fax 617.354.8684 Email swgrady@gmail.com

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REVISED:

SCALE: AS SHOWN

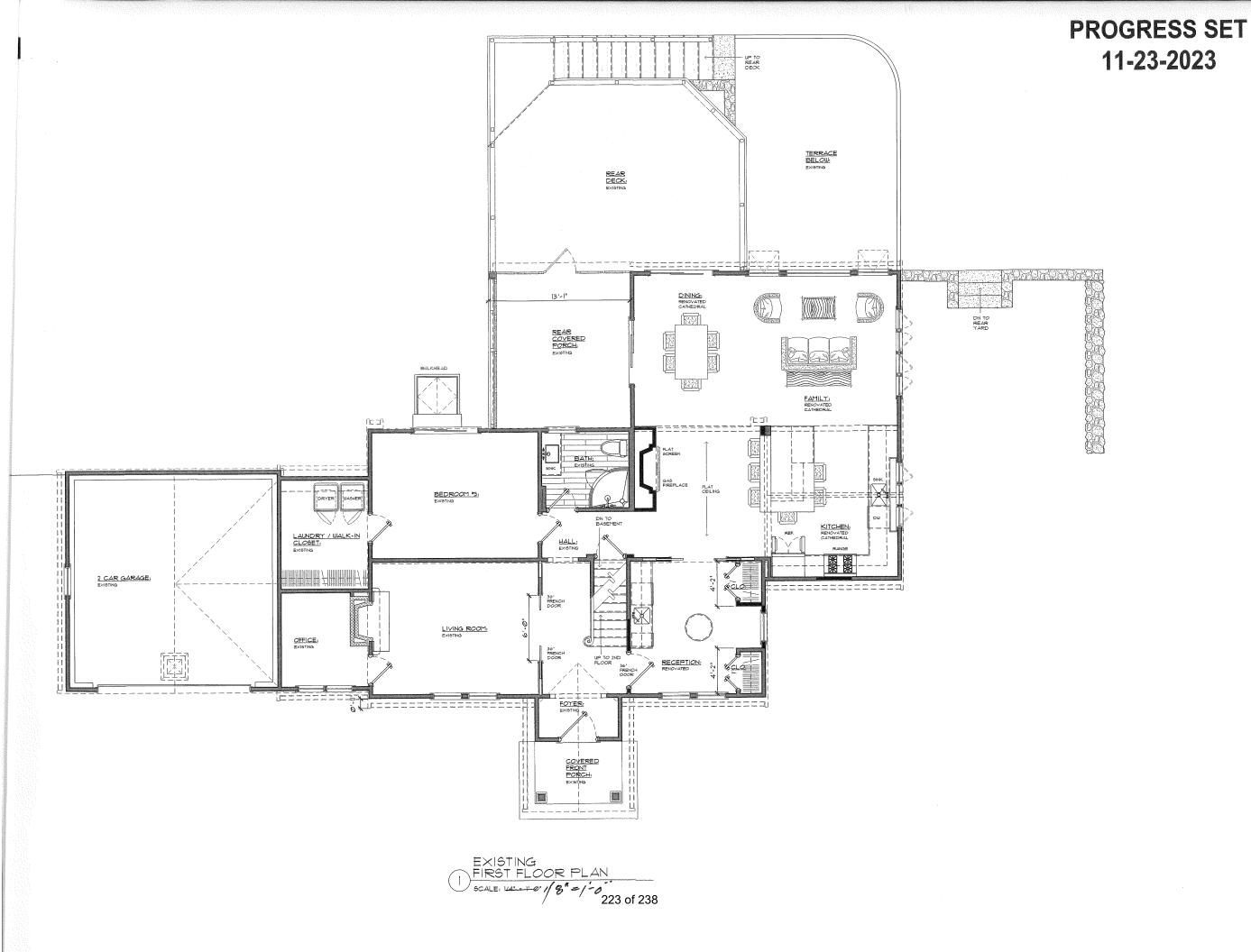
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AND JEFF
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DRAWN: CCSOARES

DATE: 11.23.2023

APPROV. BY: SWGRADY

REVISED:



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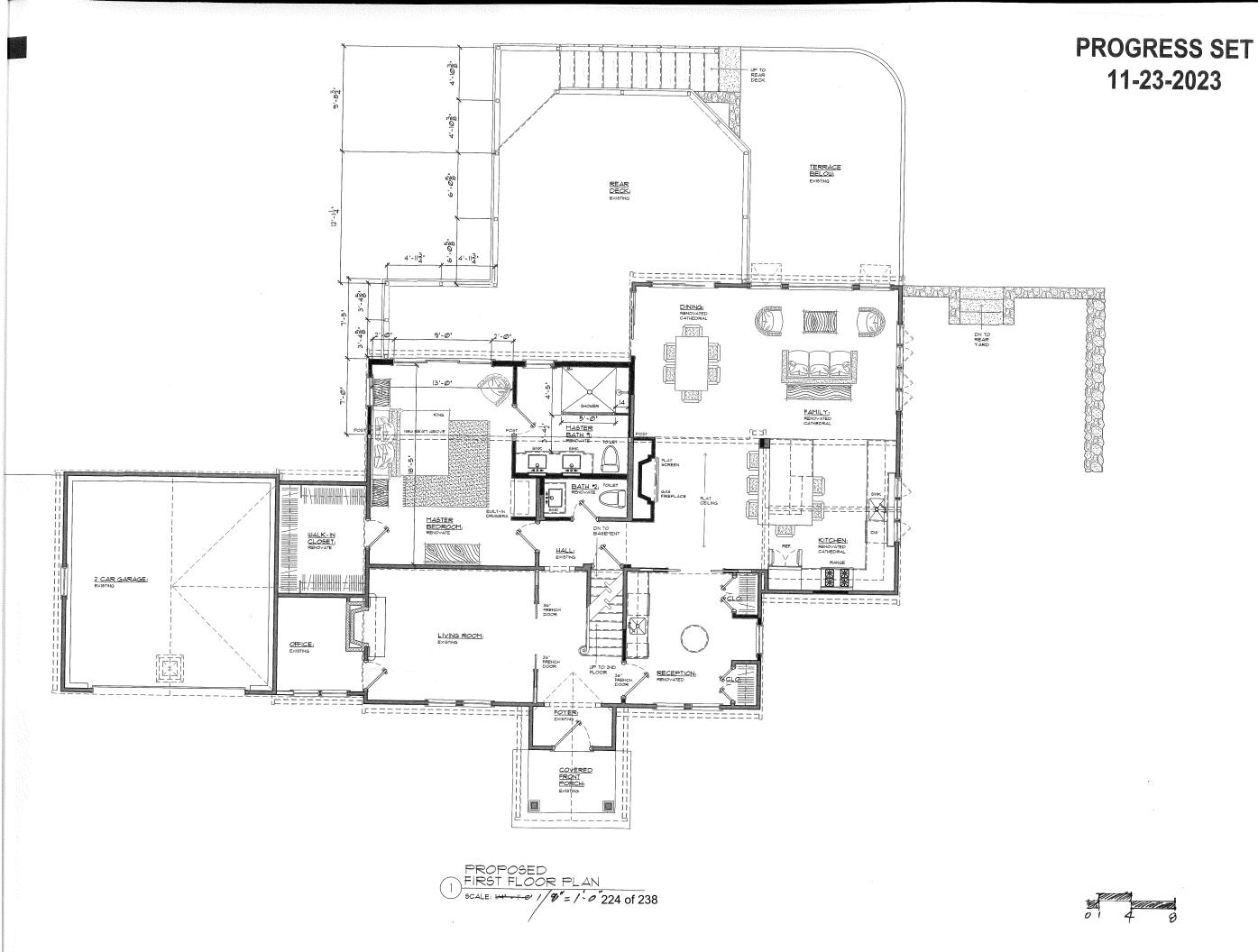
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SCOTT WILLIAM GRADY ARCHITECT

BOSTON

1105 Massachusetts Ave. #2E Cambridge, MA 02138 Cell 617.620.2420 Fax 617.354.8684 Email swgrady@gmail.com

CAPE & ISLANDS

CLIENT GAIL OCKERBLOOM AND JEFF SELBERG RESIDENCE AT 459 MYSTIC STREET ARLINGTON, MA.

DRAWN: CCSOARES

DATE: 11.23.2023

APPROV. BY: SWGRADY

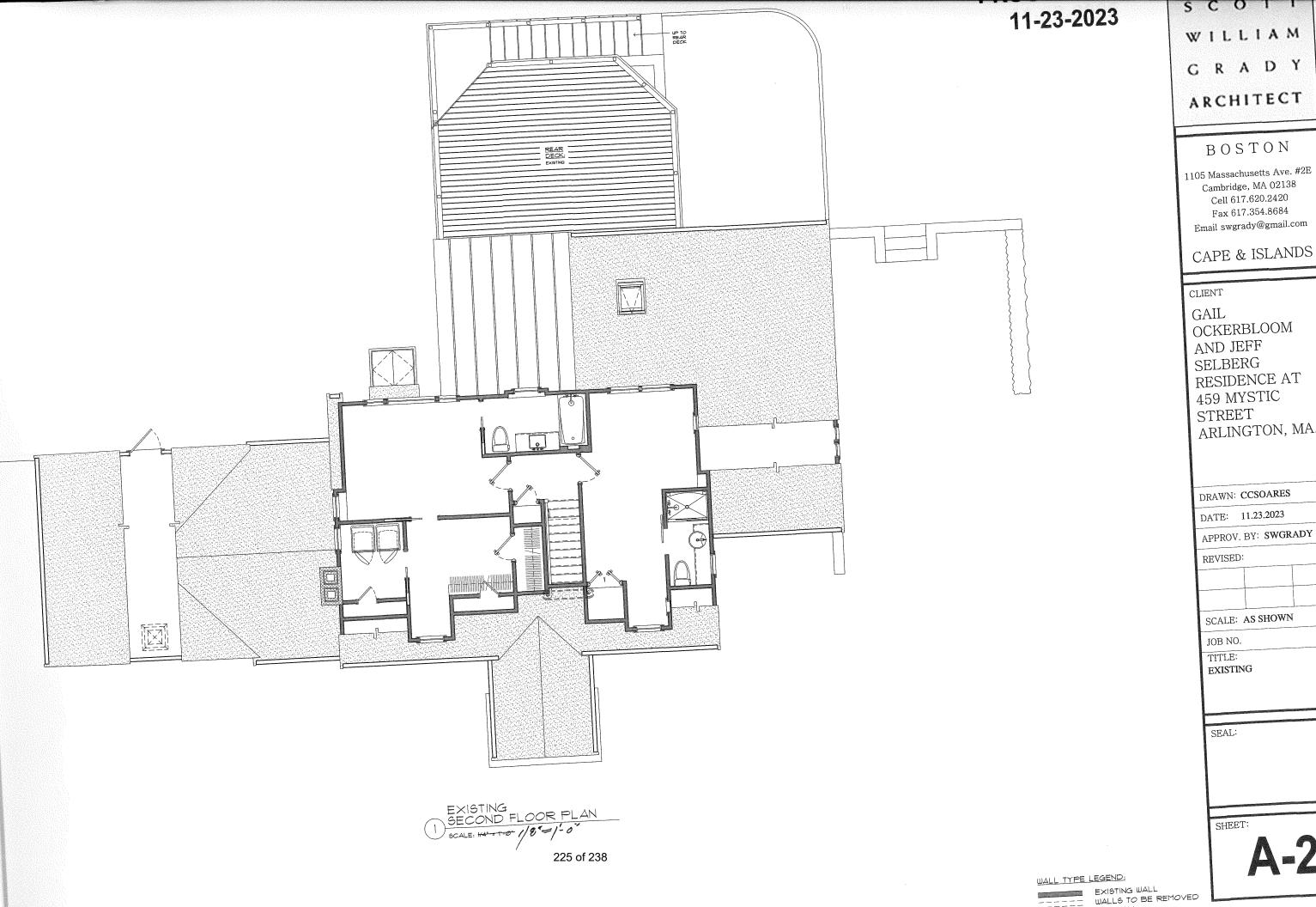
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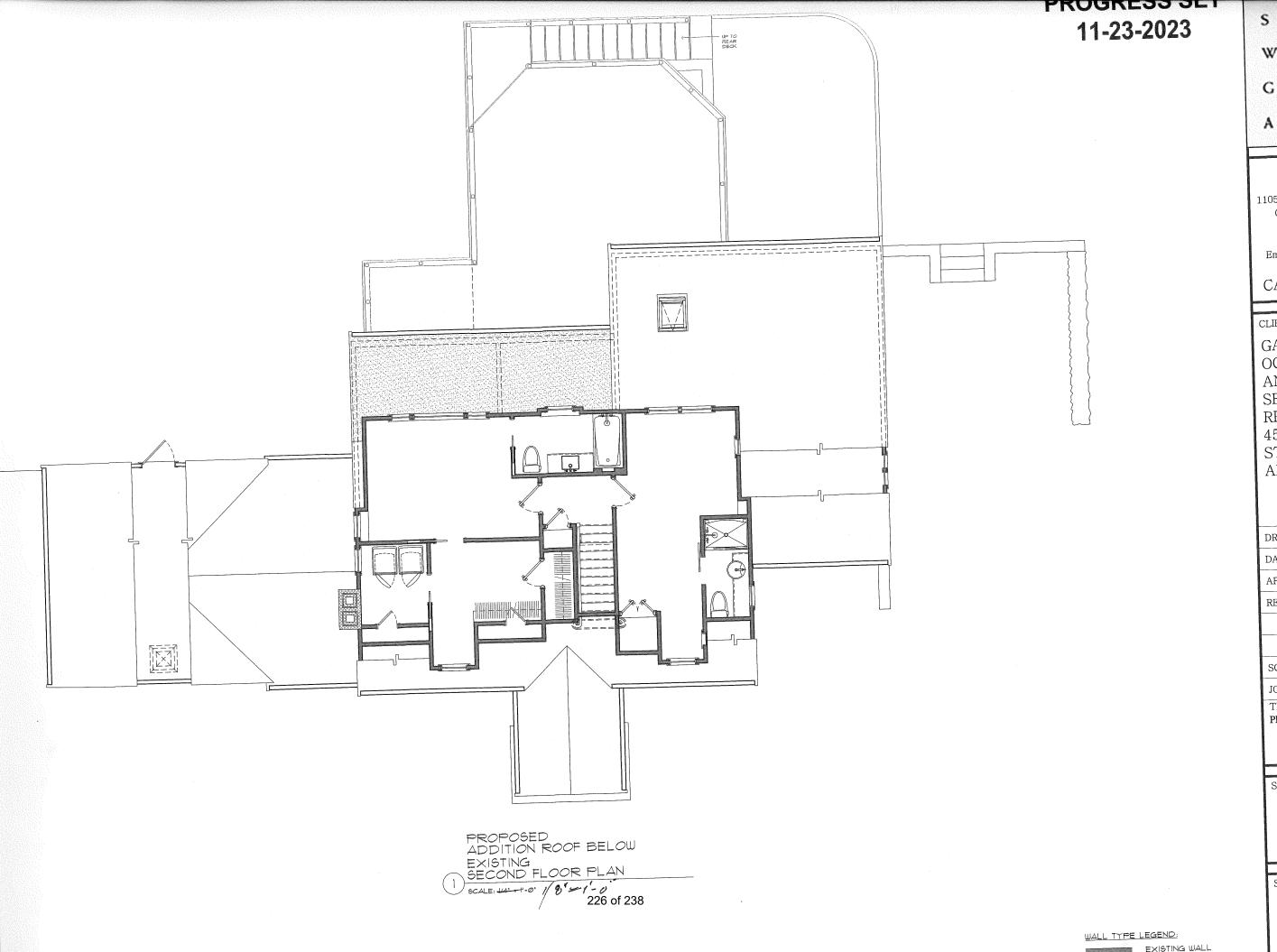
SEAL:



GRADY

Cambridge, MA 02138 Cell 617.620.2420 Fax 617.354.8684

OCKERBLOOM RESIDENCE AT ARLINGTON, MA.



SCOTT WILLIAM GRADY ARCHITECT

BOSTON

1105 Massachusetts Ave. #2E Cambridge, MA 02138 Cell 617.620.2420 Fax 617.354.8684 Email swgrady@gmail.com

CAPE & ISLANDS

CLIENT

GAIL OCKERBLOOM AND JEFF SELBERG RESIDENCE AT 459 MYSTIC STREET ARLINGTON, MA.

DRAWN: CCSOARES

DATE: 11.23.2023

APPROV. BY: SWGRADY

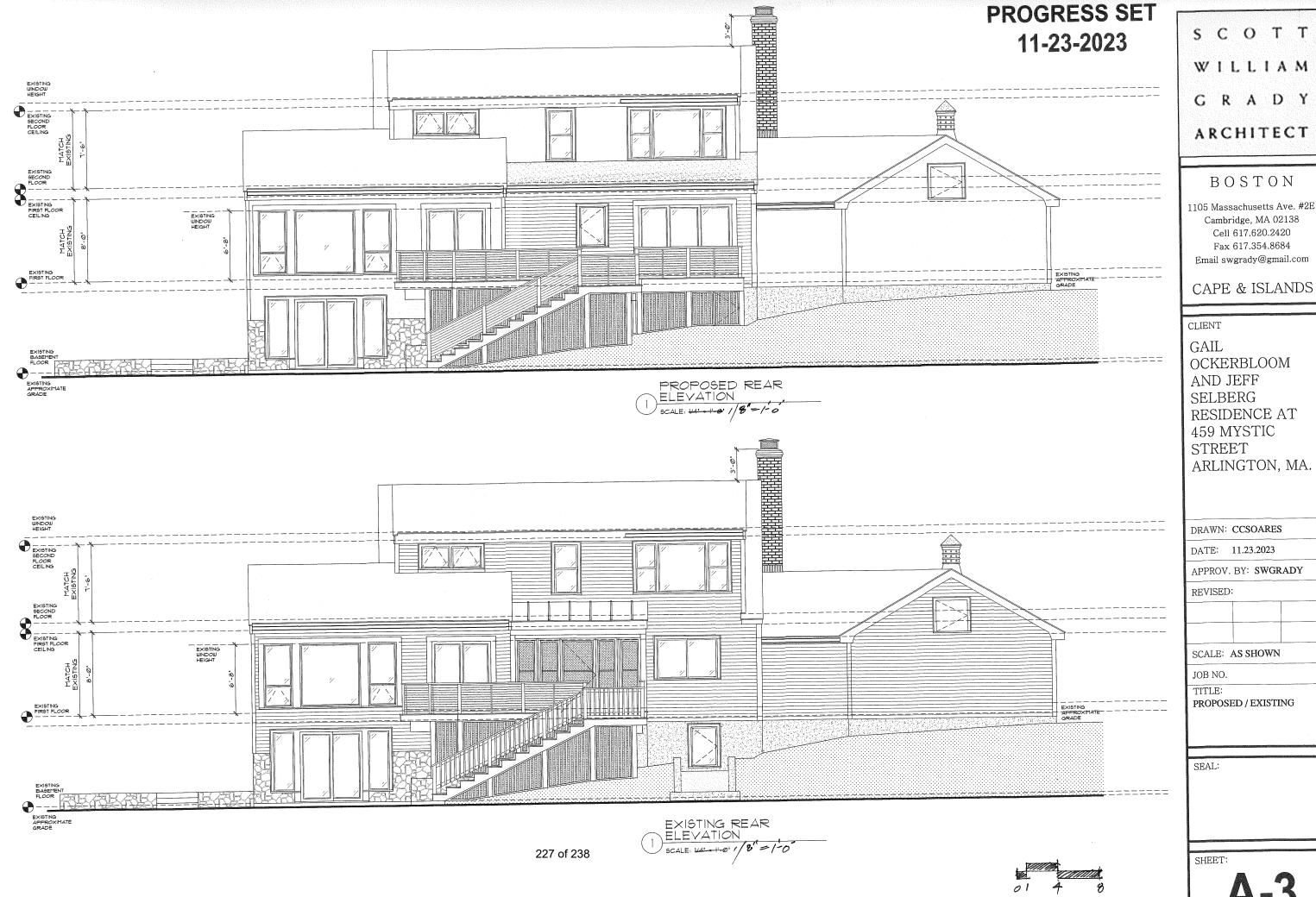
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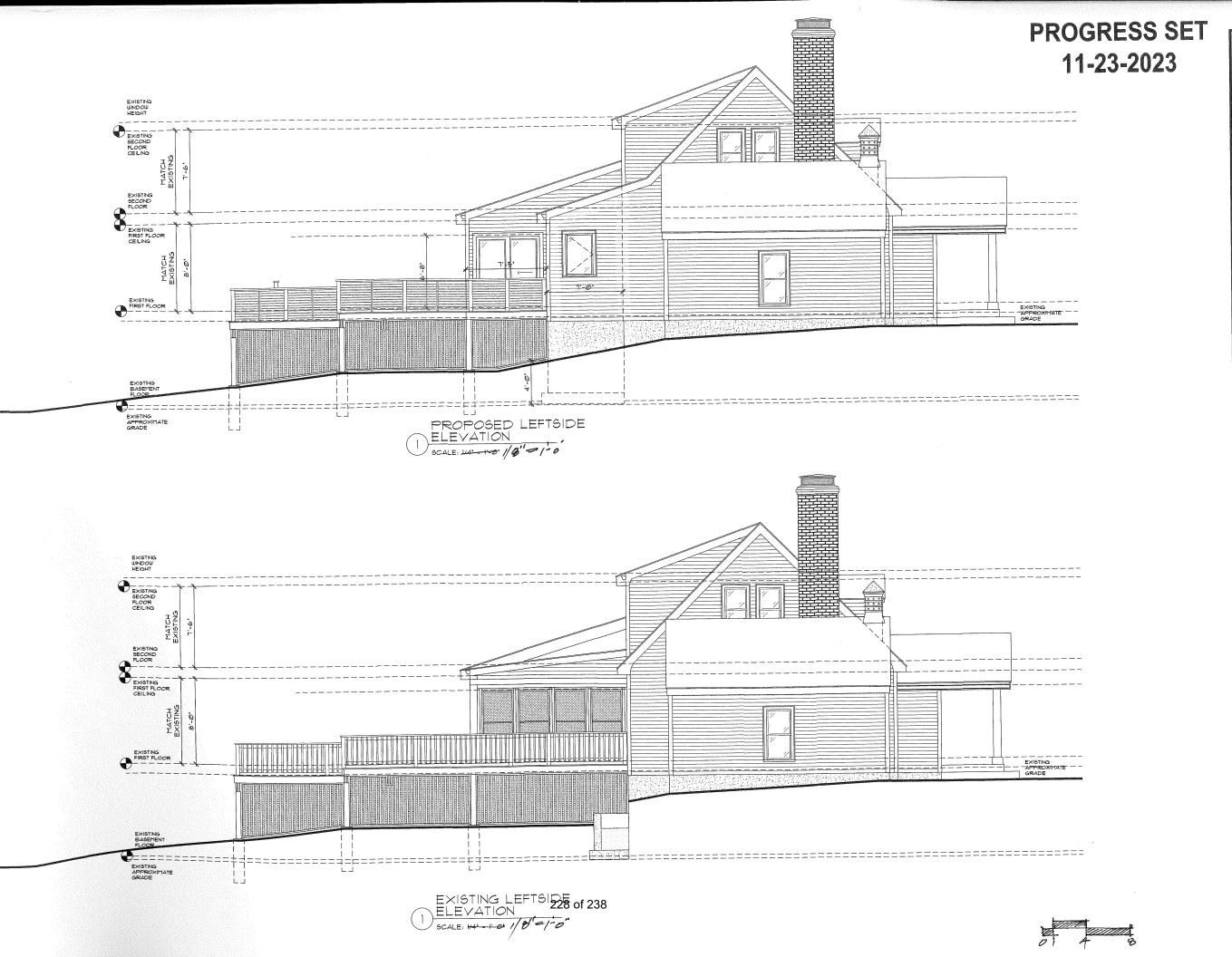
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PROPOSED / EXISTING





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APPROV. BY: SWGRADY

REVISED:

SCALE: AS SHOWN

JOB NO.

TITLE:

PROPOSED / EXISTING

SEAL:





### **Town of Arlington, Massachusetts**

### DEP #091-0278: Amendment to Order of Conditions: 88 Coolidge Road (Continued from 2/15/2024).

### Summary:

DEP #091-0278: Amendment to Order of Conditions: 88 Coolidge Road (Continued from 2/15/2024). This public hearing will consider the peer review report for an amendment to an Order of Conditions for construction of a new house at 88 Coolidge Road in the Buffer Zone to a Bordering Vegetated Wetland.

### **ATTACHMENTS:**

	Type	File Name	Description
D	Reference Material	88_Coolidge_Peer_Review_by_Nobis_Engineering-mt1gt_comments.pdf	88 Coolidge Peer Review by Nobis Engineering-mt1 - gt comments.pdf
ם	Reference Material	Response_letter_to_Nobis_review_of_December_15_2023_Civil_Response.pdf	Response letter to Nobis review of December 15 2023_Civil Response.pdf

# Mary Trudeau Wetlands Consultant 141 Lowell Street Lexington, Massachusetts 02420

781-424-4768

marytrudeau@ymail.com

February 19, 2024

Arlington Conservation Commission Town Hall Arlington, MA

Re: 88 Coolidge Road, Arlington, MA

Amendment to Order of Conditions (91-278)

#### To the Commission:

Please find the attached responses to the December 15, 2023 comments generated by the Nobis review of the proposed amendment to the Order of Conditions for 88 Coolidge Road. These updated, responses were prepared by Chad Smurtzer, PE (Structural Engineer); Alfred Taney, PE (Geotechnical Engineer); Albert Gala, PE (Civil Engineer), and Mary Trudeau, and are highlighted in red. For simplicity, we have removed commentary where Nobis agrees with, or has no further comment on previous concerns.

Question 1: Nobis accepted previous responses.

Question 2: Regarding the Foundation Plan by C. Smutzer, P.E., dated 1/13/23, the notes in the center of the drawing state that the foundation is "assumed to rest entirely on bedrock." The top surface of the bedrock at the site is known to be very irregular. This means that significant bedrock removal would be needed to accomplish this. Do you agree with this conclusion?

No—foundations are often poured on irregular bedrock—that is the reason for the pinning requirement to allow the foundation to be poured on irregular or sloped bedrock. The bedrock does not have to be flat. The bedrock must be stable, however, and all loose or shattered material must be removed.

**Nobis Note:** Nobis' July 24, 2017 letter report to the Town of Arlington noted (pg 4 & pg 11) that six test holes at the site reached "refusal" at depths ranging from 30 to 63 inches. The Nobis report further noted that "refusal" does not necessarily mean that the top of bedrock was reached (could be deeper). Nobis concluded, at that time, that "a degree of uncertainty in the configuration of the bedrock surface is still present." Nobis now recommends that the Town ask the following questions:

1. Have there been any alterations to the top of the bedrock surface since 2017? **YES** Please attach a plan that shows the areas where top of bedrock has been altered and contours of the present top of

bedrock surface. Recent changes to bedrock consist of somewhat less than approximately one cubic yard of alteration to outcrops within the building footprint. This alteration occurred in October of 2022, and resulted in removal of weathered material from a projecting outcrop. Changes resulted in minimal damage to the outcrop, and are readily visible in the photos below. Contour changes within the excavation are not affected as the outcrop is within the footprint of the future foundation and will not change significantly from the existing conditions. The applicant proposes cleaning the spoils, and exposing the intact portions of the underlying outcrop. The foundation will be pinned to the exposed outcrop. The applicant believes that removal of the weathered materials will total approximately one cubic yard of unstable material.





- 2. Is there any new information (borings, test pits, other observations) regarding the three-dimensional configuration of the bedrock surface, acquired since 2017? YES Please attach or reference a document submitted to the Commission in 2023 that provides this information. As noted above, the excavation work in October of 2022 exposed (and chipped) at the surface of a ledge outcrop, located within the footprint of the excavation for the building foundation. This is the new information referenced in earlier responses. No further test pits, borings or exploration have been done.
- 3. Based on answers to these two questions, does the Applicant believe that a foundation can be poured on the irregular bedrock at 88 Coolidge, as the bedrock surface is currently configured and characterized? Yes, providing that all loose and shattered material is removed.

Nobis Notes (December 2023): See notes regarding items 1 and 2, above. Regarding item 3, how much loose and shattered material needs to be removed? Is this a minor cleanup, or is excavation that will change the elevation or configuration of the current excavation required? The applicant believes that the loose and shattered material currently at the outcrop can be removed, as well as any remaining weathered stone on the exposed outcrop, to create a stable point to pin the foundation. This removal work is considered minor, and expected to consist of approximately one cubic yard of loose and shattered material. The applicant is not proposing a change to the finish grade of the foundation, and will incorporate solid sections of ledge within the forms for the foundation.

Question 3: Regarding the same drawing, AAT mention "cleaning" of bedrock but not removal. Is the foundation resting entirely on bedrock consistent with what is proposed by AAT? What risks might be posed by removing significant amounts of bedrock; might this cause groundwater upwelling? 231 of 238

From a structural standpoint, only the loose bedrock is required to be removed—it does not have to be level but is required to be stable with no shattered material. It is my understanding that no more intact/competent rock will be removed and therefore it is unlikely that upswelling will occur.

**Nobis Note:** Nobis suggests that the Town ask the following questions:

**4.** Can the Applicant confirm, considering the answer to the questions above, that no more intact/competent rock will be removed? Only loose or shattered material is proposed to be removed.

*Nobis Notes (December 2023): See note 3, above.* Applicant's responses to Question 2, noting that only shattered, loose, or damaged sections of ledge will be removed apply to this question, as well.

Question 4: Regarding the March 19, 2023 letter from Mary Trudeau, Wetland Consultant, how do you know how deep the weathered, poor quality bedrock in the southwest corner of the proposed foundation extends?

While this cannot be definitively answered without the removal of the loose and or weathered/cracked portions of the surficial ledge, and the subsequent exposure of stable bedrock, the intent is to remove limited amounts of weathered stone. Often the bedrock stabilizes below grade as it is the exposure to weather which can cause the loosening and cleavage. Based on our initial visual assessment, the amount of material to be removed is estimated at a cubic yard.

Nobis Notes (December 2023): The applicant acknowledges a degree of uncertainty; Nobis believes that the probability of needing to remove a large quantity of weathered rock or excavating to significant depth is low. Nobis recommends that the Commission have an observer on site when this is done and/or require photo of video documentation.

The applicant is willing to engage an observer on site, and or provide photo or video documentation of the ledge work.

**5.** Is support of excavation (e.g. sheet piling) anticipated to excavate to top of competent bedrock?

It is anticipated that competent bedrock is not at a depth requiring excavation support.

Nobis Notes (December 2023): Response accepted on the condition that the Commission be informed and provided the opportunity to comment if competent bedrock is deeper than anticipated and requires excavation support.

The applicant agrees to notify the Conservation Commission if ledge excavation and clean up exceeds that which has been described to Nobis, and referenced on the submitted site plans.

Based on the Foundation Plans, dated 1/13/2023, Gravel Base is required below the proposed concrete slab. What is the minimum thickness of Gravel Base below the slab? If bedrock is locally shallow in the area of the slab, what is the plan for removal of bedrock? The minimum thickness of the gravel base is 12" (twelve inches). Based on current observations, bedrock does not appear to be locally shallow in the area of the slab, and will not require removal.

Nobis Notes (December 2023): Do site conditions allow emplacement of at least 12 inches of gravel without significant bedrock removal? Is this the case even in the area where the poured foundation is proposed to step up, due to shallow bedrock configuration?

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Nobis (2.27.2024) - The foundation plan, dated 1/13/2023, indicates foundations to rest entirely on bedrock, which doesn't match this response. In general, foundations are typically designed to rest entirely on bedrock, or entirely on a minimum thickness of structural fill, to minimize the risk of potential concrete cracking due to being supported by materials with a different stiffness. Another approach could be to use a construction joint in areas where the subgrade stiffness changes. In areas where bedrock is very deep, a transition zone may be appropriate where a minimum thickness of crushed stone is used over say 15 to 20 feet, in combination with a construction joint. We recommend the foundation plan be updated, as necessary.

designed to allow for exposure of a stable surface to allow for the pinning of the future foundation. Crushed stone will be used as needed, to the depths required to stabilize the footing.

Question 5: What if you have to extend the excavation deeper than the intended grade? Will you then remove more bedrock to lower a larger area down to the southwest corner's grade or will you emplace fill in the low area to even out the excavation? If so, how will this affect drainage?

If the bedrock removal needs to go below grade, engineered fill can be used to backfill the work area. We are looking for either a level surface or stable bedrock to ensure a solid foundation. It is our understanding that no more intact rock removal will occur, and that the removal of weathered or exposed ledge will be the extent of the alterations. The drainage installed on the property to control hydrostatic pressures and runoff shall be designed by the Site Civil Engineer.

**Nobis Note:** Nobis recommends that the Town should be provided with an opportunity to review the drainage design by the Site Civil Engineer. A drainage design has been attached to this response

Nobis Notes (December 2023): See notes in red on the attached drainage design plan.

The design engineer, Al Gala, PE, believes that the site conditions and design of the drainage system will accommodate the site conditions posed on this property. Matt Hodges, the hydrogeologist for the site, further explains: "ONEP has excavated multiple test pits throughout the property. Groundwater (i.e., measurable and persistent water) was not encountered in any of the test pits. Evidence of mottling was observed in only the first few inches of overburden directly above the ledge (i.e., bedrock). The limited mottling, steep slope of the ground surface, and bedrock outcroppings are indicative of a situation where precipitation infiltrates into the overburden and flows along the surface of the bedrock. That water most likely daylights at some point downhill and becomes surface water runoff from the site.

To the extent that an existing groundwater elevation could be established at the site, that elevation would be beneath the surface of bedrock.

Stormwater temporarily stored in subsurface structures will not change the groundwater elevation because that stormwater will never be in contact with the groundwater. The thin layer mottling above the bedrock is evidence that the bedrock is impermeable relative to the overburden. Mounding of stormwater will likely occur while the water exfiltrates from the storage structure. The duration of that exfiltration will be on the order of days and will necessarily be followed by periods no exfiltration (i.e., periods when it is not raining). The intermittent nature of the mounding and the permeability of soils/fill will not create a situation where the hydraulic gradient is sufficient to push the stormwater into the bedrock.

Therefore, we conclude that the proposed subsurface storage of stormwater will not change the groundwater elevation at the site.

Question 6: In the AAT letter (2/14/23), AAT recommends that pinning the foundation to bedrock should be conditioned on inclusion of a foundation drain system to be designed by a Civil Engineer. Mary, do you agree with AAT's recommendation? Can you please explain who on the team will be designing the foundation drain?

A perimeter drain around the foundation will be required as per the building code, and designed by a Registered Professional Engineer. The perimeter drain will connect the outflow water from the subsurface drainage systems, at different elevations and route it to a new area of crushed stone below the deck/patio. It is expected the pinned foundation walls will have below surface weep holes to allow drainage from behind the walls to drain into the perimeter drain.

**Nobis Note:** Nobis recommends that the Town accept this response but be provided with an opportunity to review the drainage design by the Site Civil Engineer.

### A perimeter drain plan is attached to this response.

Nobis Notes (December 2023): Please see separate mark-up of "GSAplan 10.1" by Nobis Civil Engineer, Sean McDowell, P.E.

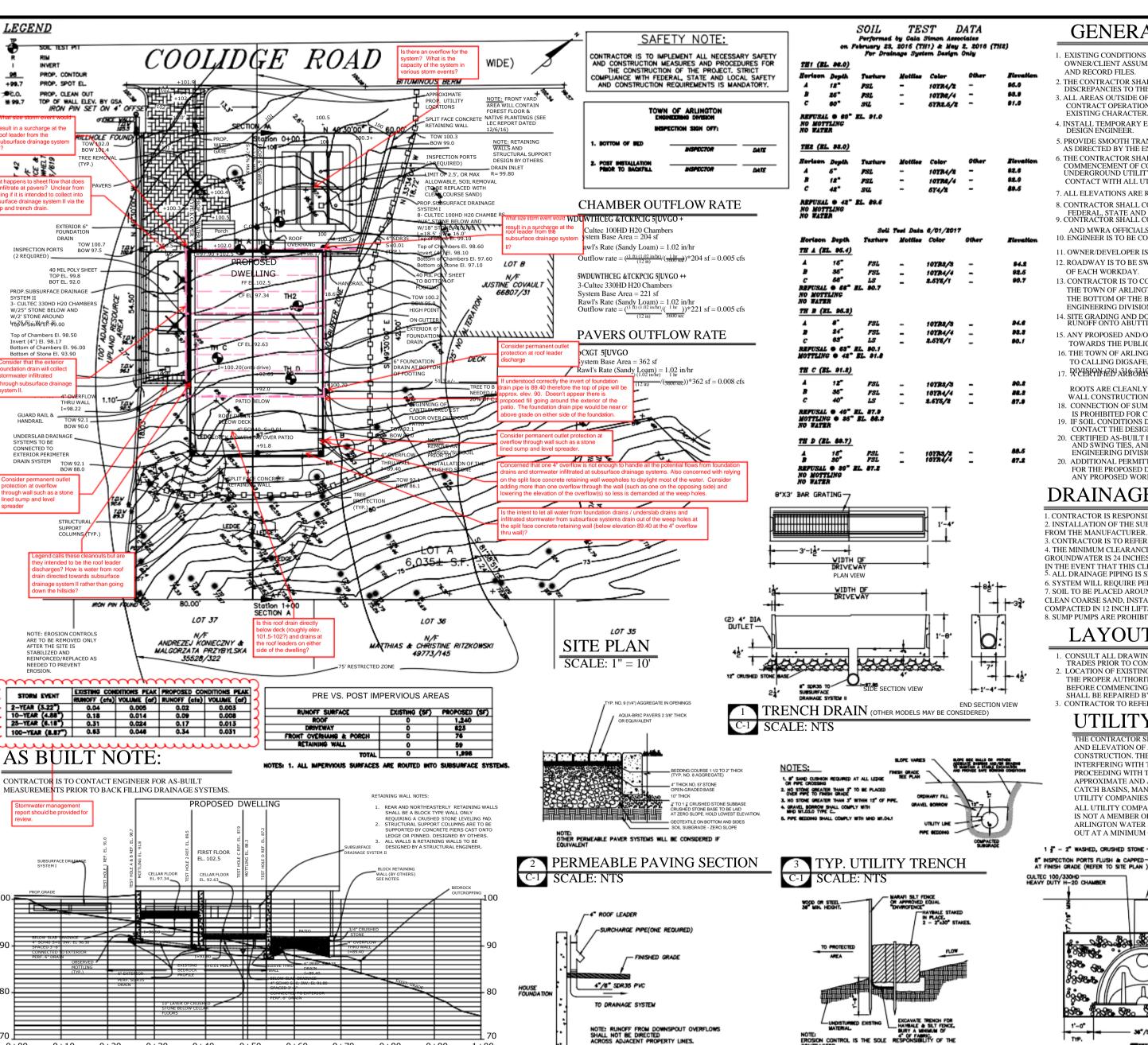
Comments from the design engineer have been added to the perimeter/drainage plan for the project.

Thank you for the opportunity to respond to the Nobis comments. Feel free to contact me with any questions.

Sincerely,

Mary Trudeau, Wetlands Consultant

Many Dudeau



235 of 238 ROOF LEADER W/DOWN SPOUT

C-1 SCALE: NTS

0+20

**SECTION A-A** 

SCALE: 1" = 10' H & V

0 + 30

0+50

0+60

0+80

# **GENERAL NOTES**

- 1. EXISTING CONDITIONS SURVEY INFORMATION OBTAINED FROM ROBER SURVEY, ARLINGTON, MA. OWNER/CLIENT ASSUMES ALL RESPONSIBILITY FOR SOURCES AND AUTHORIZATION TO USE ELECTRONIC AND RECORD FILES
- 2. THE CONTRACTOR SHALL VERIFY ALL EXISTING INFORMATION ON THE GROUND AND SHALL REPORT ALL DISCREPANCIES TO THE ENGINEER IMMEDIATELY FOR A DECISION PRIOR TO CONSTRUCTION. 3. ALL AREAS OUTSIDE OF THE LIMIT OF WORK LINES SHALL NOT BE DISTURBED IN ANY MANNER BY THE CONTRACT OPERATIONS. THE CONTRACTOR SHALL KEEP OUT OF THESE AREAS AND PRESERVE THEIR
- 4. INSTALL TEMPORARY EROSION CONTROL MEASURES PRIOR TO CONSTRUCTION FOR APPROVAL BY THE DESIGN ENGINEER.
- 5, PROVIDE SMOOTH TRANSITION AT CHANGES IN GRADE EXCEPT AS INDICATED ON THE DRAWINGS AND
- AS DIRECTED BY THE ENGINEER. 6. THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL UNDERGROUND UTILITIES PRIOR TO THE COMMENCEMENT OF CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL UNDERGROUND UTILITY LINES; ACTIVE OR NOT, AND SHALL MAINTAIN A CLOSE AND CONSTANT
- CONTACT WITH ALL UTILITY COMPANIES INVOLVED. CALL DIG-SAFE 888-344-7233 7. ALL ELEVATIONS ARE REFERENCED TO AN ASSUMED DATUM.
- 8. CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS, PERMITTING, AND LICENSES ISSUED AT THE
- FEDERAL, STATE AND LOCAL AGENCIES.

  9. CONTRACTOR SHALL COORDINATE ALL SITE UTILITY IMPROVEMENTS WITH THE TOWN OF ARLINGTON
- AND MWRA OFFICIALS. 10. ENGINEER IS TO BE CONTACTED BY CONTRACTOR TO PERFORM AS BUILT MEASUREMENTS
- 11. OWNER/DEVELOPER IS TO COMPLY WITH ALL OF MASSACHUSETTS DEP SITE DEVELOPMENT REGULATIONS
- 12 ROADWAY IS TO BE SWEPT OR OTHERWISE CLEANED OF DEBRIS AND SEDIMENT. AT THE END OF EACH WORKDAY.
- 13. CONTRACTOR IS TO COORDINATE INSPECTIONS OF THE SUBSURFACE DRAINAGE SYSTEM WITH THE TOWN OF ARLINGTON ENGINEERING DIVISION. ONE INSPECTION WILL BE REQUIRED FOR THE BOTTOM OF THE BED AND ANOTHER AFTER INSTALLATION AND PRIOR TO BACKFILLING. ENGINEERING DIVISION REOUIRES 24 HOURS ADVANCE NOTICE.
- 14. SITE GRADING AND DOWNSPOUT OVERFLOWS SHALL NOT DIRECT CONCENTRATED STORMWATER RUNOFF ONTO ABUTTING PROPERTIES.
- 15. ANY PROPOSED AND/OR FUTURE SUMP PUMP INSTALLATION SHOULD NOT BE DISCHARGED TOWARDS THE PUBLIC WAY.
- 16. THE TOWN OF ARLINGTON IS NOT A MEMBER OF DIGSAFE. THE CONTRACTOR, IN ADDITION
- TO CALLING DIGSAFE, MUST ALSO CONTACT THE TOWN OF ARLINGTON WATER AND SEWER 17. PIZEKPIKEBI AKBOAKISTATILEAST PRESENT SURKRETWALLY ENSAKATIONS TO INSURE ANY TREE
- ROOTS ARE CLEANLY CUT AND THAT TREES ARE ADEQUATELY PROTECTED DURING
- WALL CONSTRUCTION. 18. CONNECTION OF SUMP PUMP SYSTEMS TO THE PROPOSED STORMWATER MANAGEMENT SYSTEM
- IS PROHIBITED FOR CURRENT AND FUTURE OWNERS. 19. IF SOIL CONDITIONS DO NOT MATCH THE TEST PIT INFORMATION, THE CONTRACTOR SHALL
- CONTACT THE DESIGN ENGINEER AND ARLINGTON ENGINEERING DIVISION FOR REVIEW. 20. CERTIFIED AS-BUILT PLANS OF THE DRAINAGE SYSTEM, INCLUDING ELEVATIONS, DIMENSIONS
- AND SWING TIES, AND IMPERVIOUS SURFACE AREA, SHALL BE PROVIDED TO THE ARLINGTON ENGINEERING DIVISION FOLLOWING INSTALLATION.
- ADDITIONAL PERMITTING WILL BE REQUIRED THROUGH THE ARLINGTON ENGINEERING DIVISION FOR THE PROPOSED DRIVEWAY CURB CUTS, SEWER INSTALLATION, WATER INSTALLATION, AND ANY PROPOSED WORK WITHIN THE TOWN OWNED RIGHT OF WAY.

# **DRAINAGE NOTES:**

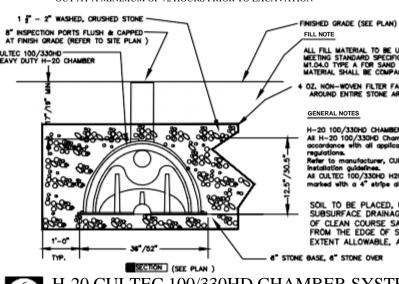
- 1. CONTRACTOR IS RESPONSIBLE FOR THE VERTICAL AND HORIZONTAL CONTROLS OF THE PROJECT.
- 2. INSTALLATION OF THE SUBSURFACE CHAMBERS IS TO BE PERFORMED ACCORDING TO RECOMMENDATIONS FROM THE MANUFACTURER.
- 3. CONTRACTOR IS TO REFER TO ARCHITECTURAL PLANS FOR EXACT LOCATION OF HOUSE DOWNSPOUTS. 4. THE MINIMUM CLEARANCE FROM THE BOTTOM OF THE SUBSURFACE DRAINAGE SYSTEM TO REFUSAL OR
- GROUNDWATER IS 24 INCHES.
- · ALL DRAINAGE PIPING IS SDR35 PVC
- 6. SYSTEM WILL REQUIRE PERIODIC INSPECTION. SOIL TO BE PLACED AROUND AND UNDER ALL THE SUBSURFACE DRAINAGE SYSTEM SHALL CONSIST OF
- CLEAN COARSE SAND, INSTALLED AT APPROXIMATELY THREE (3) FEET FROM THE EDGE OF STONE AND COMPACTED IN 12 INCH LIFTS.
- 8. SUMP PUMPS ARE PROHIBITED FROM CONNECTING TO THE SUBSURFACE DRAINAGE SYSTEM.

# LAYOUT & GRADING NOTES

- 1. CONSULT ALL DRAWINGS AND SPECIFICATIONS FOR COORDINATION REQUIREMENTS BETWEEN ALL
- TRADES PRIOR TO COMMENCING NEW CONSTRUCTION.
- 2. LOCATION OF EXISTING UTILITIES SHOWN ARE DIAGRAMMATIC ONLY. CONTRACTOR SHALL CONTACT THE PROPER AUTHORITIES IN WRITING TO CONFIRM THE LOCATIONS OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. ANY DAMAGE INCURRED DURING CONSTRUCTION TO ANY UTILITY SHALL BE REPAIRED BY THE CONTRACTOR AT NO ADDITIONAL COST TO OWNER.
- 3. CONTRACTOR TO REFER TO A SURVEYOR PLOT PLAN FOR ACCURATE OFFSETS TO PROPERTY LINE

## UTILITY NOTES:

THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING AND DETERMINING THE LOCATION, SIZE AND ELEVATION OF ALL EXISTING UTILITIES, SHOWN OR NOT SHOWN ON THIS PLAN, PRIOR TO ANY CONSTRUCTION. THE ENGINEER SHALL BE NOTIFIED IN WRITING OF ANY UTILITIES FOUND INTERFERING WITH THE PROPOSED CONSTRUCTION AND APPROPRIATE REMEDIAL ACTION BEFORE PROCEEDING WITH THE WORK. THE LOCATION OF ALL UNDERGROUND UTILITIES SHOWN HEREON ARE APPROXIMATE AND ARE BASED ON THE FIELD LOCATION OF ALL VISIBLE STRUCTURES SUCH AS CATCH BASINS, MANHOLES, WATERGATES, ETC. AND COMPILED FROM PLANS SUPPLIED BY VARIOUS UTILITY COMPANIES AND GOVERNMENT AGENCIES. ALL CONTRACTORS SHOULD NOTIFY, IN WRITING ALL UTILITY COMPANIES OR AGENCIES PRIOR TO ANY EXCAVATION WORK. THE TOWN OF ARLINGTON IS NOT A MEMBER OF DIGSAFE, WHERE ACTIVITIES REQUIRE A MARK OUT OF LITH ITIES. THE TOWN OF ARLINGTON WATER & SEWER DIVISION SHALL BE CONTACTED AT 781-316-3310 TO REQUEST A MARK OUT AT A MINIMUM OF 72 HOURS PRIOR TO EXCAVATION



MI.OA.O TYPE A FOR SAND BORROW.

MATERIAL SHALL BE COMPACTED TO 85% DENSITY OZ. NON-WOVEN FILTER FABRIC, TOP, SIDES AND BOTTOM AROUND ENTIRE STONE AREA (FULLY WRAPPED TYPICAL)

H-20 100/330HD CHAMBERS by CULTEC, INC. of Brookfield, CT All H-20 100/330HD Chambers must be installed in

regulations.
Refer to manufacturer, CULTEC, INC.'s recommended installation guidelines.
All CULTEC 100/330HD H20 Heavy Duty units are marked with a 4" stripe along the length of the chamber

SOIL TO BE PLACED, UNDER AND AROUND THE SUBSURFACE DRAINAGE SYSTEM SHALL CONSIST OF CLEAN COURSE SAND, INSTALLED AT LEAST 3' FROM THE EDGE OF STONE, OR TO THE MAXIMUM EXTENT ALLOWABLE, AND COMPACTED IN 12" LIFTS.

6 H-20 CULTEC 100/330HD CHAMBER SYSTEM

C-1 SCALE: NTS

5 HAYBALE/SILT FENCE BARRIER

C-1 SCALE: NTS

Gala Simo Associates l

LOWELL

DRAINAGE/GRADING

MASSACHUSETTS

ARLINGTON

ob No. 1606 | Date: 6/3/2016

Drawn By: AG Socie: AS SHOW

2 9.27.16 BBVW, House

4 11.17.16 House, drive

5 12.2.16 House, drive

6 07.03.17 Solls, elevs.

1 8.31.16 Section

3 10.18.16 Grading

7 08.07.17 Section

8 09.22.20 Section

10 05.16.22 Comments

9 04.21.22 House

11 10.30.23 drains

Description:

Rev# Date:

COOLIDGE

88



Gala Simon Associates, Inc. Civil Engineers 394 Lowell Street, Suite 18 Lexington, MA 02420 www.gsadesign.com

Tel: 781-676-2962

February 20, 2024

Arlington Conservation Commission Town Hall 730 Massachusetts Ave Arlington, MA 02476

Re: 88 Coolidge Road

Dear Members of the Conservation Commission:

The following is our response to the various items depicted by the Nobis review of December 15, 2023, on our site plan dated June 6, 2016, and revised through October 30, 2023.

To address the review, our site plan was revised on January 3, 2024. The drainage report dated June 3, 2016, and revised through May 16, 2022, is also attached.

The plan is attached with the Nobis comments in red and items numbered in blue for our response.

#### Item 1

The downspout will not surcharge for the 100-year storm event. The maximum elevation within System II is at elevation 98.54. The system has a 4" PVC overflow pipe through the rear of the retaining wall that was considered in the design of the system.

### Item 2

It is anticipated that the permeable pavement will handle the runoff. A low point (el.100.3) is proposed to prevent sheet flow from being directed to the higher proposed elevation of 100.5, located at the beginning of the paved driveway. If proper maintenance, no ponding, or overflowing should be observed on the permeable drive.

Arlington Conservation Commission Project: 88 Coolidge Road

Item 3

Since the foundation drain is at a lower elevation than System II, it is likely that some runoff will be collected by the exterior foundation drain. This drain will also prevent the runoff from getting trapped behind the concrete pinned wall.

Item 4

A 4' by 4' crushed stone pad was added to the overflow outlet.

Item 5

The plan depicts downspouts. The legend uses the same symbol with "C.O." as used on the proposed sewer connection.

It is intended to have the downspout discharge onto the trench drain.

Recommend adding a note that specifies the roof drain is to daylight into the trench drain. *Item 6* 

The stormwater summary was taken from our drainage report. The drainage report is attached.

Item 7

The roof drain is below the deck and drains onto the trench drain on the driveway.

Item 8

System I has an overflow located at the downspout. Refer to detail 4.

Item 9

The system is designed for the 100-year storm event without the use of the overflow.

Item 10

The downspout does not discharge onto the ground at this location. It carries roof runoff under the decking and eventually discharging into the trench grate (System II).

Recommend adding a note that specifies the roof drain is to daylight into the trench drain. *Item 11* 

The proposed grading was adjusted at this location to provide adequate cover over the piping.

There is only approximately 6" of cover over the pipe on the north side of the proposed dwelling. Nobis still has concerns with cover at this location.

### Item 12

The revised plan proposes an 18" wide crushed stone apron with a depth of 12 inches. As there are a few overflows proposed, the apron is proposed at the rear of the patio and partially on the sides.

#### Item 13

The plan was updated with 6 overflows and the elevation of the overflows was also lowered.

### Item 14

It is expected that any runoff that is not routed into ledge site crevices will eventually spill out from the overflows in the rear retaining wall.

Under existing conditions, all site runoff discharges onto the rear properties. It is not the intent of this design to change those conditions. The volume and rates of runoff will be maintained to below development values.

#### Item 15

All reasonable efforts have been made to make the design comply with the DEP Stormwater Standards. The 48-inch vertical distance from bottom of systems to ledge or groundwater is only applicable to projects of larger magnitude such as multi family developments, commercial, industrial or projects with 4 or more residential lots. In those cases, not a single-family dwelling, a mounding study would be required if the subsurface drainage systems had less than 4 feet from bottom to ledge or groundwater.

Our expectation is that the above responses are satisfactory and will allow the project to move forward.

Sincerely,

Alberto M. Gala, P.E. Civil Engineer